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THE PRESIDENT'S ADDRESS TO THE CANADIAN MEDICAL ASSOCIATION*

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Toronto

A YEAR ago on assuming office as President, I addressed the Association when it convened in Toronto for the annual meeting. To-day, in Saint John, I give you a valedictory message; an account of my stewardship on my retirement from the presidential chair. Your President is virtually two years in office. During the first year as "president elect" his activities are concentrated upon the program for the ensuing meeting over which he will preside on his induction as President. The meeting in Toronto a year ago was a great success both with regard to the number in attendance and in the excellence of the scientific contributions. Success was due to the indefatigable labours of the committee on the program whose untiring effort, over many months, was brought to such a successful issue.

Last July the Association was invited to attend the centenary celebrations, in London, of the founding of the British Medical Association. Accordingly a tour was arranged. There were 200 persons in the party that sailed from Montreal to Belfast on the *Duchess of Athol* on July 2nd. Various points were visited in Ireland, Scotland, England and Wales before arriving in London. At each of these places the party was entertained by the local branch of the British Medical Association. Wonderful hospitality was enjoyed by the visitors who were given every opportunity to attend clinics, to enjoy the scenery and to visit places of great beauty and historic interest. Transportation from point to point was by motor cars. Finally they reached London where the activities contingent upon the centenary celebrations were in progress. Every facility was given for the Canadian contingent to participate in these celebrations. The program furnished an opportunity of a unique character to see something of the famous institutions of the old land that are centred in the great metropolis of the Empire. These afforded a most appropriate setting for the various functions that were conducted with the greatest dignity and impressiveness. We wish to record our gratitude to the British Medical Association for their splendid hospitality.

One of the most active members of the overseas contingent was Dr. A. S. Monro, of Vancouver, the immediate past president of our Association. With profound sorrow we learned that, on his way home, he suffered a heart attack at Saskatoon and died the following day (August 12th) in the city hospital. Dr. Monro was an ideal President. A man of strict integrity, he held the esteem and respect of the community in which he lived. With untiring energy and with the support of his colleagues, he worked unceasingly for our Association. The outstanding success of the Vancouver meeting was a tribute to his ability, his loyalty and his resourcefulness. He did not spare himself, in fact we fear that his health, already impaired by war service in the eastern Mediterranean, suffered as the result of the strain to which he was subjected on our behalf. We can ill spare men of such calibre. The medical profession throughout Canada is indebted to him for what he had already accomplished and we are impoverished by his early death. He had embarked on a detailed study of economic problems affecting medical practice. In this and in other fields he had the capacity for clear vision and logical deduction. Not only

* Read before the Council at the sixty-fourth Annual Meeting, Saint John, N.B., June, 1933.

in his executive capacity but as a true and loyal friend, one of generous temperament and sympathetic spirit, he will be greatly missed in his own city and province and throughout the entire Dominion.

In Canada we suffer from the economic depression that is world-wide in its operation. We are hopeful that the present signs of improvement will progress so that ere long more normal conditions will be re-established. We have reason to congratulate ourselves that throughout this trying period we have been able to maintain efficiency in the varied activities of our national association. The splendid financial support, we have enjoyed in recent years, has been of the greatest value and the profession throughout the entire country, as well as the sick folk in many communities, are deeply indebted to our generous benefactors. The assistance received from them has enabled us to carry on post-graduate instruction in numerous centres throughout Canada from the Atlantic to the Pacific, and practitioners in all parts of the country have had the opportunity of keeping well abreast of recent advances in scientific medicine. As a result we have increased efficiency in the ability of the practitioner to cope with the problems of disease. It follows that the health of the community is better maintained and those who suffer from disease or injury are afforded the maximum degree of relief.

The Sun Life Insurance Company, found it necessary to discontinue, since October, 1932, the generous annual grant made by them for post-graduate lectures. They recognize with us the great value of the work accomplished throughout Canada as a result of their financial assistance for the past seven years. We are mutually hopeful that ere long, in better times, their contributions may be resumed. Beyond this special service we are still greatly indebted to the same Company for their continued support of the Department of Hospital Service which they endow with large annual grants.

The Canadian Life Insurance Officers' Association is continuing its annual contribution for the Health Service Department. We are most grateful for the financial aid we receive from this source, enabling us to carry on work of the highest value in the maintenance of national health.

In view of the necessary curtailment of the usual program for post-graduate instruction, your Executive Committee has already arranged that these activities should continue, in a modified form, to the limit of our resources. We are hopeful that it will be possible to keep this splendid service alive until we are once more in a position to resume full activities.

The Health Service Department is continuing its good work. Among other projects we may note that a conference was held with the Radio Commission at Ottawa, resulting in the assurance that the Commission would cooperate with the Canadian Medical Association in all matters concerning radio broadcasting relating to public health. Following our representations, the Department of National Health has taken active steps, working with the Radio Commission, to eliminate from the air unwarranted statements relating to remedial agents or pertaining to the medical care of the sick.

One of the major activities of the Canadian Medical Association and one whose contacts have spread far beyond the personnel of our profession is that of the Department of Hospital Service. This bureau has been of the greatest assistance to hospitals throughout Canada, particularly to the smaller hospitals. Hospital data and literature have been collected, forming an extensive library. Many valuable and informative studies have been made, bulletins have been printed and distributed, while numerous hospitals have been visited throughout Canada. The Department has been working in the closest cooperation with the various hospital associations throughout this country and the United States and much desirable progress has been made. A fuller understanding and a closer cooperation between the medical profession and the hospitals has been a noteworthy result. The Department was largely instrumental in effecting the formation of the Canadian Hospital Council, which has already amply justified its existence and has rendered a signal service to our larger hospitals by setting up standards for the approval of hospitals for internship.

The Canadian Medical Association is constantly on the alert to assist the profession in solving many problems concerning their welfare. Of recent date we were able to cooperate with the Department of National Revenue concerning the Dominion Income Tax. This re-

sulted in the drafting of a memorandum, issued in pamphlet form and sent to every doctor in Canada, outlining in detail the method of preparing income tax returns and, in particular, the list of legitimate exemptions from taxation. It is of special interest to note that certain concessions were made as the result of our representations. The service thus rendered would undoubtedly compensate many times the annual fee paid for membership in the Canadian Medical Association.

It is of interest to analyze the effect of economic depression on the practice of medicine. All industrial activities in our communities are greatly curtailed and unemployment is widespread. Not long ago, in Calgary, the Minister of Public Health for the Province of Alberta stated, when addressing an audience of medical men, that the only group of persons in the province with no unemployment in their ranks was that of the medical practitioners. He added that unfortunately they failed to receive pay for their services! Similar conditions exist in the other provinces of Canada. The sick are ever with us both in prosperous times and in periods of financial depression. It therefore becomes a problem as to the responsibility of the State to provide medical service for the indigent, whose numbers are vastly increased in such times, and who are liable to become victims of disease or injury. In addition, many who are still financially solvent are economizing and will take the risk of illness without medical attention or will put off a necessary operation rather than incur the expense.

The State recognizes its responsibility in the relief of the unemployed and the indigent. Food, clothing, fuel, etc., are provided. Medical treatment is also essential. The medical profession has always been noted for its philanthropic service in treating the poor without monetary return. In prosperous days this is not only possible but is regarded by the practitioner as a privilege. On the other hand when conditions exist that not only curtail the number of patients who might pay for medical service but also increase the percentage of those demanding service who cannot pay the doctor's bill, we come to an *impasse*. The doctor may be overworked and yet unable to earn a livelihood.

Your Association has therefore been active in attempting to secure recognition by the State of its responsibility. Medical relief is just as urgently required as food and clothing and should be placed in the same category. We have kept in close touch with the Provinces where, in some cases, a certain amount of relief has been obtained. We are also urging the Federal Government to recognize its responsibility and we are hopeful that the time is not far distant when Federal relief funds will be made available for medical relief purposes.

The Committee on Economics with Dr. Harvey Smith as Chairman and Dr. Grant Fleming as Secretary, is making an intensive study of the economic problems to which we have referred. In addition they are studying health insurance in all its aspects. This strong committee has representatives in all the provinces of Canada and we feel confident that its active prosecution of this study, and the influence it exerts, will result in a satisfactory solution of these vexed questions.

Your Association takes an active interest in all forms of suggested legislation affecting national health and the medical profession. The most recent experience in that regard concerns an attempt, in the Ontario Legislature, to place the osteopaths on the medical register, securing equality of status with practitioners who have complied with all the requirements of the Council of the College of Physicians and Surgeons of Ontario,—the licensing body, under the medical act, for the Province. The Ontario Medical Association acted with the Council and with representatives of the National Association and the universities of the province. They were successful in preventing what would obviously have been a gross injustice both in the interest of public health and to the profession of medicine.

A Committee for the study of Cancer has been operative, under the chairmanship of Dr. J. S. McEachren of Calgary. It is hoped that some scheme may be evolved that will increase our resources to combat successfully the ravages of malignant disease and thus aid in eradicating a dire menace to national health.

The medical profession throughout Canada have shown their confidence in the Canadian Medical Association, as an institution performing a great national service both in the interest of the profession itself and in the conservation of public health. Its service to the practitioner, through its many activities, increases the effi-

ciency of medical men and indirectly, by this means, is a national asset of incalculable value to the State. In spite of a shrinkage in income and the resulting financial embarrassment of individual practitioners, our profession have striven valiantly to maintain ideals. This is apparent in the remarkable way in which the membership has been sustained. A certain reduction has been inevitable but we are greatly encouraged to find that in 1932 as compared with 1931, the net loss in membership was only 36. The figures for 1933 are not yet available but the prospect appears equally good.

There is no room for pessimism. Those who harbour such sentiments should receive drastic treatment, although, perhaps not as drastic as that in vogue in Scotland in the sixteenth century. Comrie tells us that the hereditary blacksmith at Milmartin through thirteen generations employed a traditional remedy for lowness of spirits, described as follows:—

> "The patient being laid on the Anvil with his Face uppermost, the Smith takes a big Hammer in both his hands, and making his Face all Grimace, he approaches his Patient, and then drawing his Hammer from the Ground, as if he design'd to hit him with his full Strength on the Forehead, he ends in a Faint, else he would be sure to Cure the Patient of all Diseases; but the Smith being accustomed with the performance has a dexterity of Managing his Hammer with Discretion; tho at the same time he must do it so as to strike Terror in the Patient, and this they say has always the design'd effect."

The secretary's office of the Association is a great clearing house for many problems affecting individual practitioners. The General Secretary conducts an extensive correspondence all over Canada dealing with multifarious difficulties encountered in practice or in institutional work. The experience gained over many years, has made our efficient General Secretary, a guide, philosopher and friend to many who seek his advice, among the medical practitioners throughout the Dominion.

We are met to-day in Council to consider and, if possible, solve many problems concerning the varied activities of the Association. The Council accomplishes a most useful purpose; its membership includes representatives from every province of Canada. All matters of an executive character are brought before this body for final disposition. It is ably presided over by Dr. A. T. Bazin, who, for many years, has devoted much time and study to the affairs of the Association. We are greatly indebted to him for the good work he has accomplished.

The *Journal* of the Canadian Medical Association has maintained its status as one of the leading medical periodicals among English speaking people. We are under deep obligation to the Editor for his achievement.

Finally, on leaving the President's Chair let me express my profound thanks for the loyal support I have received from the members throughout Canada and for the confidence they have imposed in me.

I might express the hope that in some measure my life may have been consistent with the sentiments expressed in a quaint epitaph on the tomb of one of my ancestors, Gilbert Primrose, in the sixteenth century. It was a confession of faith, combined with a flavour of Scotch reticence in retrospect: it reads in part as follows:—

> "While I lived I willed; my will, Christ, was Thine; so neither life nor death was bitter to me."

Slang or exotic phrase, then, is mischievous when it leads to the neglect or degradation of something richer or choicer. Before we pick up smart words or exotic words, we are to see that we have none better in our possession. For instance; "rôle" is inferior to "part", for "rôle" takes us back to a dried sheepskin,* whereas to play a part is to be engaged in the drama itself. "Summary" is at least as good as "résumé"; and "dernier ressort" has no advantage over "last resort". "Raison d'être", "tout ensemble", "cortège", "par excellence", etc., etc., give us nothing that we have not of our own. "Taboo" is generally used incorrectly and in this common use is no better than "ban". There is no virtue in the barbarous "cavitation" which is not in the civiller word "excavation".—T. Clifford Allbutt, from Notes on the Composition of Scientific Papers.

* I find I must explain that in former days actors' parts were written on parchment rolls.

NERVOUS CONTROL OF GASTRIC SECRETION AND EFFECT OF VITAMIN DEFICIENCY ON ITS PRODUCTION*

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THERE are at least two mechanisms which regulate the secretory activity of the gastric glands—a nervous and a humoral. In the following paper the present stand of our knowledge concerning the nervous mechanism of secretion is discussed. This problem has been experimentally reinvestigated in our laboratory during the last few years, and the results obtained have permitted us to draw the conclusions presented below.

PARASYMPATHETIC INNERVATION OF THE GASTRIC MUCOSA

The vagal innervation is one of the most important mechanisms activating the secretory function of the stomach. Through a reflex mechanism, of the type of an unconditioned or conditioned reflex, a state of long-continued activity is initiated in the gastric glands. The secretion of gastric juice evoked by the vagi is very copious. It has a high acidity, is rich in pepsin and contains a great amount of "dissolved mucin". The acidity and chlorine content is somewhat higher than in the juice secreted during the second or chemical phase or under the influence of such stimulants as alcohol (Webster[1, 2]). The digestive power of the vagal gastric juice is much higher than that of the juice of the chemical phase. Whereas during even prolonged stimulation of the gastric mucosa through the vagi the peptic power hardly diminishes, it has a marked tendency to fall in the case of the action of chemical stimulants (Babkin[3]). Repeated injections of histamine cause only a very small secretion of pepsin, although the liquid parts, hydrochloric acid and other mineral constituents of the juice are readily produced (Babkin,[4] Vineberg and Babkin,[5] Gilman and Cowgill[6]). The secretion of "dissolved mucin" in the gastric juice (Webster and Komarov[7]) is to a certain degree related to that of pepsin, although their courses do not always run parallel (Webster[1]).

It is evident that the parasympathetic nervous system produces a most powerful effect on the secretory elements of the gastric mucosa, and on almost all of them.

Experiments involving electrical stimulation of the vagus revealed the fact that the nerve contains at least two kinds of secretory fibres for the gastric mucosa (Vineberg[8]). Rhythmic stimulation with a weak induction current caused a scanty flow of mucoid secretion from the whole stomach, as well as from the isolated fundic portion, while strong stimulation produced a copious flow of acid gastric juice possessing strong peptic power. Both effects were abolished by atropin but not affected by ergotamin (Baxter, unpublished). Therefore both types of fibre belong to the parasympathetic nervous system and not to the sympathetic, as was claimed by Kiss[10, 11] regarding all the visceral fibres of the vagus.

A recent histo-physiological investigation by Bowie and Vineberg (unpublished) showed that after a long-continued rhythmic stimulation of the vagi by induction current the peptic cells contained fewer granules and were somewhat shortened and the lumen of the gland became consequently wider. In the stimulated cells the cytoplasm was more densely arranged than in the resting cells, and the nuclei were not so close to the base of the cells as in the latter. On the other hand, after a copious gastric secretion sustained for several hours by repeated subcutaneous injections of histamine the peptic cells were not reduced in size. They appeared similar to the normal controls. These histological findings support the above-mentioned physiological conception of separate regulation of activity in the various cytological groups composing the gastric glands.

Very little is known concerning the distribution of vagal fibres to the different parts of the

* Read at the meeting of the American Gastro-Enterological Association at Washington, May 9, 1933.

gastric mucosa. The investigations of the last ten years have shown, however, that various parts of the gastric mucosa which secrete gastric juice have different macro- and microscopical structures. An especially marked difference was found in the structure of the mucous membrane of the lesser curvature (Billenkamp[12]). The so-called "Magenstrasse" which stretches along the lesser curvature is lined with a very thin mucous membrane, which gradually increases in thickness towards the greater curvature.

In order to investigate the physiological topography of the gastric mucosa, Miss A. Alley in our laboratory compared the gastric secretions from an Armour pouch (Armour[13]) and from a Pavlov pouch in dogs. The first is formed from the lesser curvature and regions adjoining it, its nerves and vessels being kept intact. The latter is formed from the fundus in the region of the greater curvature. There was no marked difference in the course of the gastric secretion in the two varieties on a meal of meat and bread, but on a meal of milk the type of secretion was completely reversed in the Armour-pouch dog. Instead of a maximal secretion in the third hour, as is usually observed in Pavlov-pouch dogs, the greatest flow of secretion occurred in the first hour. This indicates that the secretion from the Armour pouch is of a "nervous" type. A very powerful reflex phase influences the whole course of the secretion, even in the case of liquid food. To be sure, sometimes one finds a dog with a Pavlov pouch in which a meal of milk produces the greatest secretion in the first hour, but such animals are comparatively rare. However, the three Armour-pouch dogs investigated by Miss Alley all gave regularly in response to milk the type of secretion described above.

Another feature of the Armour pouch was that the latent period of secretion to every kind of meal was shorter than in the cases of the Pavlov pouch. Experiments in which one of the Armour pouch dogs with œsophagotomy and a gastric fistula was sham-fed, showed that the latent period of secretion in the pouch (3 minutes) was shorter than in the whole stomach (5 minutes). On the other hand, the whole stomach reacted more promptly to subcutaneous injection of histamine than the Armour pouch. The variations in the acidity of the juice from the two types of pouch did not present any great differences, but in some of Miss Alley's dogs the peptic power was somewhat higher in the juice secreted by the Armour pouch than in that secreted by the Pavlov pouch.

These data indicate that in the regions surrounding the lesser curvature, and perhaps in that part itself, the gastric glands are under more active control of the vagi than in the regions adjoining the greater curvature. Should the formation of a gastric ulcer be due to any external cause, then the parts of the stomach where the mucous membrane is thin and bathed in strong gastic juice would suffer most. Indeed gastric lesions are usually found in the region of the lesser curvature or close to it.

Miss Alley's findings are confirmed to some extent by the work of Brenckmann and Deloyers[14] and Brenckmann.[15, 16] They investigated the distribution of coloration with Prussian blue in the mucous membrane of the dog's stomach, when the organ was excised from the body and rinsed in warm water during rest or digestion, or after histamine administration. A sharp blue coloration, indicating the presence of HCl on the surface of the mucosa was observed in the corpus of the stomach when excised after a meal. The antrum and pylorus were coloured brown, and the fundus (poche à air) showed a greenish coloration. In young dogs (eight to nine weeks old) the Prussian blue can only be seen in a narrow zone on both sides of the lesser curvature. After the injection of histamine the corpus as well as the fundus showed marked hyperæmia and a blue coloration, indicating that the drug stimulated the production of HCl in both parts of the stomach.

In this connection it is interesting to note that during its embryological development the dorsal wall of the primitive spindle-shaped stomach grows faster than the ventral and forms the convex greater curvature. The ventral wall which remains concave forms the lesser curvature. The fundus arises as a local bulge at the anterior (cranial) end of the stomach. It is therefore justifiable to suppose that the conditions for the secretion of gastric juice by the gastric mucosa in the region of the lesser curvature are somewhat different from those prevailing in the region of the greater curvature.

Sympathetic Innervation of the Gastric Mucosa

There is great confusion with regard to the part played by the sympathetic nervous system

in gastric secretion. In the hands of some investigators stimulation of the splanchnic nerves produced an extremely scanty, sometimes quite indeterminate, secretion of acid gastric juice (Volborth and Kudriawzeff[17]). According to others (e.g., Bickel[18]) the sympathetic nerve supplies the fundic glands chiefly with inhibitory fibres, and sends secretory fibres to the pyloric glands. No less controversial are the data concerning the effect of adrenaline on the gastric secretion, this drug according to some investigators inhibiting and according to others stimulating the gastric secretion (see Babkin[19]).

The problem of the sympathetic innervation of the gastric mucosa was reinvestigated in our laboratory (Baxter[9]). In anæsthetized cats and dogs freshly cut or partly degenerated splanchnics were stimulated by a rhythmic induction current for several hours, or small doses of adrenaline (0.5 c.c. 1:5,000 or 1:10,000 solution every five minutes) were introduced intravenously. The vagi were cut under the diaphragm or in the neck. Whereas in control experiments the secretion from the stomach when disconnected from the œsophagus and duodenum was extremely scanty (0.15 to 0.3 c.c. per hour), stimulation of the splanchnics and administration of adrenaline produced a regular flow of 2 to 3 c.c. of mucoid fluid of alkaline reaction. Currents of high and low frequency produced the same effect. Atropin had no effect, while ergotamine inhibited the secretion. Previous sensitization with cocaine increased the effect of splanchnic stimulation.

The course and the properties of the secretion activated by splanchnic stimulation are as follows. The secretion is mucoid and alkaline (8 to 14 milliequivalents). The concentration of chlorine (450 to 500 mg. per cent) is lower than in the gastric juice (600 to 700 mg. per cent). The organic material in the secretion gradually diminishes, the ash remaining constant. This indicates that we were dealing here with a true secretory process, where the sources of mucoid substance became depleted during prolonged stimulation. The reducing power of the secretion was high, but the peptic power was very low.

Special experiments in which a glass window was sewn into the gastric wall showed that stimulation of the splanchnics inhibited any movement of the gastric wall or of the mucosa itself. The mucous membrane became pale during stimulation of the nerve or injection of adrenaline. Nevertheless a formation of mucus could be clearly observed in the folds of the mucous membrane and on its surface. Therefore this secretion was not due to the pressing out from the folds of the mucosa of mucus previously accumulated there. Twenty-four to seventy-two hours after aseptic section of the splanchnics a scanty "paralytic secretion" of mucoid fluid from the stomach was noted. Stimulation of partly degenerated splanchnics (vasoconstrictor and secretory fibres to the suprarenals were ineffective) and injection of epinephrine markedly increased this secretion. Cocaine sensitized the partly degenerated splanchnics; ergotamine blocked their effect and inhibited the paralytic secretion.

To determine the rôle of the sympathetic nervous system in the normal course of secretion during its first or nervous phase, experiments before and after splanchnectomy were performed on cats with œsophagotomy and gastric fistula. Not very marked yet definite changes occurred in the secretion of the gastric juice induced by a standard sham-feeding. The volume of the secretion remained practically the same. The free and total acidities were somewhat lowered (10 to 11 per cent). The output of pepsin and dissolved mucin changed its course after the section of the splanchnics. Instead of a gradual rise, as noted in the normal animal, it reached its peak in the first 20 to 25 minutes and then abruptly fell. These findings may be explained partly by the admixture of the juice of the "paralytic secretion" and partly by the lack of impulses normally transmitted to the mucosa through the sympathetic nervous system.

An attempt was made to determine which part of the gastric mucosa secretes mucus under splanchnic stimulation. The stomach was divided into three parts, the splanchnics were stimulated or epinephrine was injected as usual, and the mucoid secretion collected separately. Table I shows that the greatest secretion was produced by the pyloric part, less by the body, and the smallest amount by the fundus. The secretion from the pyloric part was mucoid and alkaline throughout. The body of the stomach, in which the reaction was often acid at the beginning of the experiment, became alkaline and mucoid during stimulation. On the other hand, the mucous membrane of the fundus, which pro-

duced a very scanty amount of secretion, quite often remained acid during the whole experiment.

The probable explanation of these findings is that the mucoid fluid secreted under splanchnic stimulation or under epinephrine is derived from the mucoid cells or "Zwischenzellen". These cells are small in number at the cardiac end and gradually increase towards the antrum (Aschoff,[20] Brenckmann[16]).

These experiments establish the fact that the sympathetic nervous system has some relation to the secretion of mucoid fluid by the gastric mucosa. Whether the peptic and parietal cells of the gastric glands are activated through the sympathetic nervous system, as some investigators believe, has still to be demonstrated.

TABLE I

STOMACH DIVIDED INTO THREE SECTIONS

Experiment June 22 Cat	Capacity of fundus pouch 10 c.c.	Capacity of body pouch 24 c.c.	Capacity of pyloric pouch 4.5 c.c.
Splanchnics stimulated for 7 hours	Total secretion 1.0 c.c.	Total secretion 3.6 c.c.	Total secretion 7.0 c.c.
Experiment June 1 Dog	Capacity of fundus pouch 26 c.c.	Capacity of body pouch 45 c.c.	Capacity of pyloric pouch 5 c.c.
Epinephrine, 1:5000 for 7 hours	Total secretion 0.25 c.c.	Total secretion 3.6 c.c.	Total secretion 4.4 c.c.

VITAMIN DEFICIENCY

Among the factors which influence the response of the gastrointestinal tract to food, vitamin B deficiency long ago attracted the attention of investigators. It is well known that in experimental vitamin B deficiency marked pathological changes occur in the walls of the alimentary canal, as well as impairment of its motility (see Browning[21]). Several investigators noted a diminution in the gastric secretion when the diet was devoid of vitamin B (Miyadere,[22] Shinoda,[23] Farnum,[24] Gilman[6]). The results obtained by all these authors were, however, complicated by loss of appetite and inanition in the experimental animals, which factors might greatly affect the response of the gastric glands to a standard meal. Farnum[24] reported also a diminished reaction of the Pavlov pouch in dogs when histamine was injected subcutaneously. Her data, however, are not quite conclusive on account of the great variations in the secretory response of the pouch to histamine.

Drs. D. R. Webster and J. C. Armour in our laboratory had the opportunity of reinvestigating the effect of vitamin B deficiency on the gastric secretion, as there were available for experiment three dogs with œsophagotomy and gastric and duodenal fistulæ, which were obstructed at the pylorus and were being fed through the duodenal fistula. These dogs had not lost their appetite, so that sham-feeding experiments could be performed on them, as well as experiments involving subcutaneous injection of histamine hydrochloride. Vitamin deficiency greatly affected the gastric secretion in these animals. The following experiment on one of these dogs may be quoted as representative. Dog "L" was on a diet of glucose, casein and olive oil, receiving vitamins by administration of cod liver oil, yeast and tomato juice. On the eighth day after the removal of the vitamin-containing food from the diet, not only was the gastric secretion provoked by intestinal feeding diminished but also the response of the gastric glands to histamine and sham-feeding. Thus before avitaminosis 0.75 mg. histamine injected subcutaneously gave 56 c.c. of gastric juice in thirty minutes, and sham-feeding 76 c.c. in one hour. On the eighth day on a vitamin-free diet the response of the gastric glands was 4.6 c.c. in thirty minutes and 7 c.c. in one hour respectively.

Ten days later, in spite of the introduction of 500 c.c. of water into the intestine, to exclude any possible dehydration, subcutaneous injection of histamine hydrochloride and sham-feeding again gave practically the same result (3.8 c.c. and 2.2 c.c. of gastric juice respec-

tively). At the end of the three weeks of vitamin-free diet the animal was somewhat depressed, but retained an excellent appetite. Ten grm. of powdered yeast were now added to the daily diet. After three days an almost complete restoration was observed in the response to histamine (48.5 c.c. of gastric juice in 45 minutes) and to sham-feeding (67.2 c.c. in 1 hour, 15 minutes).

A further withdrawal of yeast after six days greatly diminished and after twelve days practically abolished the secretion to histamine, sham-feeding and 5 per cent alcohol introduced into the intestine. Throughout the whole period of the experiment there were only very slight variations in the weight of the animal.

No analysis of this striking fact has yet been attempted. Nevertheless these preliminary experiments emphasized the importance of vitamin B for the proper functioning of the gastric glands. If this substance is lacking in the food, the secretory mechanism becomes refractory to impulses sent normally via the vagi and to any kind of chemical stimuli acting from the intestine or directly on the glandular apparatus.

CONCLUSION

The parasympathetic and sympathetic innervation of the gastric glands and their relation to different parts of the gastric mucosa and various secretory elements of these glands are discussed. It is shown that in vitamin deficiency there is great impairment of the secretory response of the stomach to sham-feeding, subcutaneous injection of histamine, and introduction into the small intestine of food and 5 per cent alcohol. By the administration of yeast normal relations were restored in a few days.

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THE ISOLATION OF *BRUCELLA ABORTUS* FROM ICE CREAM

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THE mode of transmission of *Br. abortus* from the bovine to the human constitutes a most important public health factor in connection with infectious abortion and undulant fever. If the organism remains viable through the manufacturing processes used in the preparation of the common dairy products and can remain viable in these products over considerable holding periods, then the use of dairy products made from unpasteurized milk from infected herds constitutes a channel of infection. While it is true that many large manufacturing plants use pasteurized cream, yet many small plants and private homes continue to use unpasteurized cream in the preparation of ice cream. This is also true of ice cream made from cream separated from whey after the manufacture of cheese. Many experiments have been carried out to determine the viability of *Br. abortus* when artificially inoculated into butter, cream and cheese. Carpenter and Boak[1] found that when butter was inoculated with the organism and stored at 8° C., the organism remained viable for 142 days. Voille[2] points out that in cheese, especially roquefort, *Br. abortus* can remain viable for a period of two months. Ponticaccia[3] showed that the cheese prepared from the milk of goats previously inoculated with *Br. Abortus* was heavily contaminated with the organism. Hardy[4] considers that Brucella infection is transmitted by infective dairy pro-

ducts such as butter, but he does not present confirmatory evidence.

So far as the author can ascertain, no workers in this field have studied the transmissibility of *Br. abortus* to ice cream prepared from cow's milk which was shown by bacteriological examination to contain the organism, or the viability of the organism in this product.

EXPERIMENTAL

Bacteriological investigations carried out by the author during the summer of 1932* showed that *Br. abortus* was transmissible from naturally infected cow's milk to ice cream prepared in the laboratory according to the recipe of Patterson.[5] The ice cream samples were held in a refrigerator at 32° F. and daily platings were made by removing about three grams by means of a sterile spatula, allowing to melt in a sterile Petri plate and inoculating 1/10 c.c. to the surface of poured plates according to the technique of Thompson.[6] The media used was freshly prepared liver gentian-violet agar according to the procedure of Huddleson.[7] The plates were incubated at 37° C., first aerobically for 15 hours and then for 5 days in an atmosphere containing approximately 10 per cent carbon dioxide. *Br. abortus* organisms were isolated daily until the fifth day's holding, but after this period they could not be isolated. Many other types of organisms appeared on the plates and it is possible that the Brucella organisms were crowded out by the other types. The viability for even a period of five days, however, was considered to be of consequence, since ice cream is a product which is usually consumed within a few days after the manufacture.

Continued studies on infectious abortion and undulant fever have revealed that *Br. abortus* could be isolated from "certified" and "special" milk being sold in the city of Montreal. In order to gain more extensive information on the transmissibility of *Br. abortus* to ice cream the author, in cooperation with the School of Household Science at Macdonald College, has carried out investigations to show whether or not the organism could be isolated from ice cream, as made in the home, from "raw", "special" or "certified" milk or cream. The milk samples were collected from individual cows at the dairies and were given to the School of Household Science, which carried out the preparation of the ice cream according to the methods advised for use in the home. All samples of ice cream were placed in special metal containers and were held in a refrigerator at 30° F. Platings were made at various intervals in order to determine whether *Br. abortus* could be isolated. Table I shows the results of bacteriological examinations.

TABLE I

Date Made	*Date Examined*	*Br. abortus colonies from approximately one-tenth grm. of ice cream. Sample A*	*Sample B*	*Sample C*	*Sample D*
20/4/33	21/4/33	27	50	10	20
"	26/4/33	16	24	9	8
"	27/4/33	29	34	20	23
"	1/5/33	6	8	11	7
"	3/5/33	13	4	2	1
"	5/5/33	9	1	0	0
"	10/5/33	5	0	0	1
"	15/5/33	17	0	0	0
"	20/5/33	20	0	0	0

It would appear from the figures listed in Table I that *Br. abortus* organisms are not very evenly distributed through ice cream. Samples B, C, and D, contained numerous other types of gram negative rods and these may have inhibited the growth of the abortus organism. Sample A contained, in addition to *Br. abortus*, a few micrococci and *Strep. lacticus* but no other types of gram negative rods were found. The media employed contained gentian violet in 1:10,000 dilution and this, no doubt, inhibited the growth of spore forming organisms. It would appear from the above table that *Br. abortus* is viable in ice cream, when held below the freezing point, for a period of at least one month. On investigation one finds that commercial companies may hold ice cream from one to three weeks before it is consumed, but seldom for longer periods than this. Ice cream which is prepared in the home is usually consumed within 48 hours. While some doubt still exists regarding the pathogenicity of the bovine strains of Brucella, yet, there is sufficient confirmatory evidence to demand the attention of public health officials. A review of medical literature reveals that the number of cases of undulant (Malta) fever in Canada is steadily increasing. The mode of transmission is an important factor when dealing with microorganisms pathogenic for more than one species of animal, and especially so when the organism may be transported through milk channels.

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SUMMARY

Br. abortus is transmissible from naturally infected milk or cream to ice cream and remains viable in this product, when held at temperatures below the freezing point, for a period of at least one month.

Ice cream made from "ordinary unpasteurized", "special" or "certified" milk may constitute a mode of transmission of *Br. abortus* from the bovine to the human.

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THE ASSOCIATION OF DIABETES MELLITUS AND PERNICIOUS ANÆMIA

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THE medical literature prior to 1910 contained no record, apparently, of coexistent diabetes mellitus and pernicious anæmia. In fact, the occurrence of such a combination of diseases was denied by certain writers of that period. For instance, Lazarus in 1905 stated that the finding of sugar in the urine in pernicious anæmia had never been reported. French, writing on the subject of pernicious anæmia in 1909, said that there was no abnormal tendency to the passage of sugar, acetone or diacetic acid in the urine. Williamson, in his book on diabetes published in 1898, made no mention of pernicious anæmia. In late years, authors whose words bear the weight of experience have commented upon the rarity of the co-incidental occurrence of the two diseases. Thus, Joslin, Davidson and Gulland and Naegeli have referred to the infrequency of their association.

In contrast to these preconceptions regarding the rarity of combined diabetes and pernicious anæmia is the appearance recently of several communications describing cases in which these two conditions coincided. The assumption is, therefore, that their association is not so uncommon as was thought formerly and that perhaps prevailing ideas concerning their relationship or lack of relationship will require revision in the light of modern developments.

The first published record of a case in which pernicious anæmia and diabetes co-existed is that reported by Parkinson in 1910. His patient was a man aged 49 with a severe grade of pernicious anæmia who developed glycosuria, ketosis and coma which terminated in death 15 days following the onset of what was obviously an acute form of diabetes. Post-mortem examination revealed the findings characteristic of pernicious anæmia, but the pancreas, except for being small, was normal both macroscopically and microscopically. Speculating upon the possible relationship between the two diseases, Parkinson believed that the supervention of the diabetes was in some way the direct result of the anæmia, and suggested that inadequate oxygen supply, due to diminished oxygen capacity of the blood, might have been the responsible factor.

The next reference to associated pernicious anæmia and diabetes appeared in 1918 when Chvostek, in a paper dealing with the rôle of pancreatic lesions in the production of anæmia, described a patient with both conditions. In 1923, Giffen and Bowler, reviewing the various diseases which might be associated with pernicious anæmia, claimed that glycosuria, if not true diabetes, may be secondary to anæmia. In support of their statement they alluded to one case in which the symptoms of pernicious anæmia antedated the development of polyuria and hyperglycæmia, and referred to another patient with pernicious anæmia who showed glycosuria. In 1925, Adams supplied details of two cases of combined pernicious anæmia and diabetes with mention of a third. One of these patients died in diabetic coma and the author remarked upon the apparent ineffectiveness of insulin in the presence of anæmia.

Within recent years, several examples of the coincidental occurrence of the two diseases have been published. In 1931, Root made a com-

prehensive survey of the problem and was able to collect from numerous sources 48 cases of the combination. These included cases under his own observation, published reports and clinical records supplied to him by other physicians. Two noteworthy facts emerge from his review. One is that all the cases, with few exceptions, had been observed within the past ten years; the other is that in the great majority of instances the symptoms of diabetes preceded the symptoms of anæmia. Since the compilation of that series, several additional cases have been recognized. Smithburn, Fisher and Zerfas reported 1 case in 1930 and Schumann 1 case in 1931. In considering the complication of diabetes, Murphy and Moxon, in 1931, found 3 instances of pernicious anæmia in a series of 827 diabetics. Two examples of the association were reported in 1932 by Shookhoff and another was recorded in the same year by Gibson and Fowler. Since March, 1931, 10 new cases of the combination have been observed at the New England Deaconess Hospital by Joslin *et al.*, while Root has collected data on 10 other cases. In these 28 cases which have been studied recently, the diabetes preceded the pernicious anæmia in all but 6 cases.

If any inference can be drawn from these reports it is to the effect that the prevalence of combined diabetes and pernicious anæmia has shown a notable increase during the last few years. In view of this increase, a problem worthy of consideration presents itself and several questions relative thereto seek solutions. For example, is the occurrence of these two pathological states in a patient merely a coincidence and the development of the one quite unrelated to the existence of the other? Does the prolongation of life provided for subjects of these maladies by present methods of treatment simply increase their chances of acquiring both conditions independent of each other? Is there some abnormality produced by or accompanying one disease which predisposes to the development of the other? In effect, is the patient with diabetes or pernicious anæmia faced with the possibility of an added handicap as a reward for additional years of life acquired by adherence to the principles of treatment? Further remarks concerning some of these points will be prefaced by notes on 3 patients in whom a macrocytic type of anæmia developed in the presence of pre-existing diabetes.

CASE 1

(No. 32/2643). A white man, aged 57, a merchant, in 1915 developed thirst, polyuria, asthenia, dizziness and loss of memory. Following medical examination a diagnosis of diabetes mellitus was made. He observed instructions regarding dieting for a few years, but he was aware that he was gradually failing. He was admitted to the Victoria Hospital in February, 1923, on account of his diabetic condition. At the time of entry, his urine contained 2.5 per cent sugar, a trace of albumin, a few hyaline casts and moderate amounts of ketone bodies. At that time he was reported as having complained of indefinite pains and numbness in the feet and legs. On his discharge, after eight weeks in the hospital, the fasting blood sugar was 146 mgrm. per cent and he was receiving 60 units of insulin per day, with a diet of 3000 calories. Thus he continued for the succeeding nine years except that the daily amount of insulin was reduced to 30 units. By adhering to this regimen he was able to maintain his efficiency fairly well and to manage his business. In 1930 he noticed an unusual weakness, became exhausted readily, had numbness and tingling sensations in the extremities, soreness of the tongue and mouth, and difficulty in walking. In addition to these complaints he had gastric distress, casual palpitation, dyspnœa on slight exertion and dizziness. There was no disturbance of sphincteric control and no return of polyuria or nocturia. He was told that he was anæmic and was advised to eat liver, which he did irregularly and in unstated quantities. He was able to look after his business affairs until six weeks before re-entry to the hospital on March 10, 1932.

Examination at that time revealed an obviously ill patient. There was no respiratory distress. The general nutritional state appeared to have been moderately well sustained. The skin was smooth, soft in texture, and presented a yellowish discoloration. The tongue was red, the dorsum fissured and the edges smooth. No teeth were present and no tonsillar tissue remained. There was a moderate diffuse thickening of the arteries. The blood pressure was 150/95 mm. The cardiac rhythm was regular and the heart sounds were of fair quality. The size and position of the heart appeared to be normal. The lungs were clear. The liver was palpable, but the spleen could not be felt. Ophthalmoscopic examination showed the fundi to be diffusely pale, the discs remarkably so and slightly œdematous. There was slight lateral nystagmus. A mild intermittent pyrexia existed. Neurological examination revealed a dulling of all sensations, with the exception of the joint sense, which seemed to be retained with a considerable degree of accuracy. There was marked diminution, and in places absence, of vibration-sense below the knees. The plantar reflex was normal. The knee-jerks and ankle-jerks were absent.

The blood sugar was 267 mgrm. per cent; the non-protein nitrogen 28.4 mgrm. per cent, and the icterus index 12.5. The urine, which contained 3.5 per cent sugar and a moderate amount of ketone bodies, was otherwise negative, except for an excess of urobilin. The hæmoglobin was 39 per cent; the red blood cells 1,980,000 per mm.; colour index 1.0; white blood cells 2,375 per mm.; with the following differential formula. Neutrophiles 54 per cent (mature forms 44, young forms 10), lymphocytes 39 per cent, eosinophiles 6 per cent and monocytes 1 per cent. Anisocytosis and poikilocytosis were obvious. The mean diameter of the red cells was 8.1 microns and the cell volume index 1.5. Fractional gastric analysis revealed a complete absence of free HCl, with a maximum total acidity of 18.0 c.c. N/10 per cent. Tests for lactic acid were negative. There was no evidence of bleeding from the gastrointestinal tract. Examination of the fæces showed an absence of parasitic infestation.

On a combined course for the management of diabetes and pernicious anæmia, the patient made satisfactory improvement, except in the matter of his nervous disability. He received a daily ration of 200 grm. of whole liver, the food value of which was

calculated in his diet of 1600 calories. The fasting blood sugar dropped to 115 mgrm. per cent and the urine became sugar-free and acetone-free. Although actual hypoglycæmia was never observed, he seemed to be susceptible to the effect of insulin and was more comfortable with a slightly elevated than with a normal blood sugar. While it was necessary to supply him with 40 units of insulin in the 24 hours at the beginning of his treatment, he was able finally to get along with 16 units. Unfortunately, improvement in the neurological symptoms did not parallel that of the general clinical condition. With the aid of physical therapy and muscle re-education they became less troublesome but did not disappear entirely. By the time he was able to leave the hospital, on May 17th, he could walk with the aid of a stick. The blood picture showed steady improvement. When he left for his home in a neighbouring town, where he was to continue his treatment, the hæmoglobin was 80 per cent, the red blood cells 4,230,000 per mm., colour index 0.9, white blood cells 3,000 per mm., neutrophiles 43 per cent (mature forms 25, young forms 18), lymphocytes 50 per cent, eosinophiles 3 per cent, monocytes 2 per cent and basophiles 2 per cent. Macrocytosis, anisocytosis and poikilocytosis were still evident.

It is obvious that this man, who had controlled more or less successfully a state of diabetes for 15 years, developed a macrocytic type of blood dyscrasia which corresponded in every detail with pernicious anæmia. This in turn was complicated by the manifestations of subacute combined degeneration of the spinal cord. Although the results of all the blood examinations are not recorded above, a moderate eosinophilia was present in nearly all the blood counts. This could be accounted for probably by the consumption of whole liver which, as observed originally by Minot and Murphy, is capable, apparently, of producing an excess of eosinophiles in the circulating blood.

CASE 2

(No. 22/4226). A negress, aged 58, came under observation first in August, 1922, when she was admitted to the Victoria Hospital with a diagnosis of fibroid tumour of the uterus. A subtotal hysterectomy was performed and at the same time the right ovary was removed. Her post-operative course was uneventful. During her stay in the hospital the urine showed a persistent "trace" of sugar.

In June, 1923, she was re-admitted with the typical symptoms of diabetes, namely, increasing weakness, thirst, polyuria, nocturia and pruritus vulvæ. There had been an increase in weight, following her operation, to a maximum of 222 lbs. There is mention in the clinical notes on that occasion of numbness in the fingers and toes. The urine contained 5.0 per cent of sugar and the blood sugar was 316 mgrm. per cent. Under dietetic management the glycosuria disappeared and the blood sugar returned to normal. She was observed from time to time in the out-patient clinic and follow-up records showed that she kept her diabetes reasonably well controlled.

The third hospital admission was in September, 1925, when the patient came on account of pain in the lower part of the back, which she attributed to be the result of an accident which she had sustained a short time before while alighting from a street car. Examination revealed no structural abnormality. The urine then contained a "trace" of sugar and the fasting blood sugar was 150 mgrm. per cent. In March, 1930, she reported with progressive general weakness, sore mouth and tongue, tingling sensations in the hands and feet, gastric distress and occasional diarrhœa. The urine was sugar-free and acetone-free; the blood sugar was 129 mgrm. per cent; hæmoglobin 90 per cent; red blood cells 3,470,000 per mm.; colour index 1.17; white blood cells 6,350 per mm., neutrophiles 52 per cent (mature forms 49, young forms 3), lymphocytes 40 per cent, monocytes 8 per cent. The red cells showed anisocytosis, poikilocytosis, and polychromasia. Treatment with liver extract, the equivalent of 400 grm. of fresh liver per day, was instituted.

In April, 1930, she developed cellulitis of the right hand with pus formation, which necessitated hospital care for seven weeks. The infection had a deleterious effect upon both the diabetes and the anæmia. The blood sugar rose to 227 mgrm. per cent and 15 units of insulin daily were required to keep it within normal limits on a diet composed of 115 grm. of carbohydrate, 120 grm. of fat and 75 grm. of protein (1840 calories). As the infection subsided, the fasting blood sugar returned to normal (107 mgrm. per cent) and insulin treatment was discontinued. The hæmoglobin percentage fell subsequently to 57 and the red blood cells to 3,000,000 per mm. Outside of hospital, instructions regarding liver usage were followed irregularly.

Examination in June, 1932, showed the patient to be well-nourished, weighing 160 lbs. The tongue was red and smooth. The right tonsil was hypertrophied and adherent. Double dentures were present. There were no palpable lymph glands. There was slight generalized arterial thickening; the blood pressure was 170/98 mm. The lungs were clear. The apex beat was diffuse, heaving and displaced outwards; the cardiac rhythm was regular; the heart sounds were of fair quality with no bruits. The liver was not demonstrably enlarged or displaced. The spleen was palpable and somewhat tender on pressure. No peripheral œdema existed. There was no evidence of involvement of the nervous system.

The laboratory findings were as follows: hæmoglobin 67 per cent; red blood cells 3,900,000 per mm.; colour index 0.80; white blood cells 4,300 per mm., neutrophiles 63 per cent (mature forms 60, young forms 3), lymphocytes 35 per cent, monocytes 1 per cent, basophiles 1 per cent. Anisocytosis was obvious. Megalocytes were present. The mean diameter of the red cells was 8.0 microns and the cell volume index 1.2. A preparation of fresh blood was examined for the presence of so-called sickle cells but none of these were observed after 36 hours. The Van den Bergh test gave a faintly positive indirect reaction. The icterus index was 25.0. Fractional gastric analysis revealed a complete absence of free HCl, with a maximum total acidity of 15.0 c.c. N/10 per cent. The tests for lactic acid were negative. The urine contained neither sugar, acetone nor albumin, but there was a slight excess of urobilin. The fasting blood sugar was 130 mgrm. per cent and the non-protein nitrogen 22.6. The Wassermann test on the blood was negative.

While this case does not present quite such a striking picture of pernicious anæmia as the preceding one, the clinical and laboratory data would seem to substantiate a diagnosis of this disease as well as diabetes mellitus. The anæmia apparently developed after the onset of the diabetes and at a time when the latter condition was under control. However, the precise time of onset of the anæmic process cannot be stated with certainty. In this case, as in the previous one, there was noted in the history the existence of paræsthesia before pernicious anæmia was suspected. In this regard a matter of practical

importance arises. Both diabetes and pernicious anæmia are subject to nervous complications. While the underlying pathology and the clinical manifestations of these are different in the two diseases, as demonstrated by Woltman and Wilder in 1929, the symptoms are sufficiently alike especially in the early or mild states to give rise to some confusion as regards interpretation. All disturbances of sensation complained of by the patient with diabetes may not be attributable to diabetic "neuritis". Careful search should be made for evidences of spinal cord involvement, supplemented by a detailed investigation of the blood and stomach contents. Such procedures might provide some clues which would lead to a suspicion of, if not a diagnosis of, pernicious anæmia before the supervention of the more characteristic subjective symptoms.

CASE 3

(No. 33/750). A white woman, aged 76, entered the Victoria Hospital on May 8, 1931, for treatment for diabetes mellitus, which condition had existed for about one year previous to that date. Her chief complaints were thirst, polyuria, nocturia and vague abdominal discomfort which was unrelated to the ingestion of food. The principal abnormalities discoverable on physical examination were generalized arterial thickening, hypertension and moderate cardiac enlargement. The blood pressure was 200/100 mm. There was nothing remarkable about the appearance of her skin; no peripheral œdema was present. The lungs were clear and examination of the abdomen revealed nothing pathological. Her weight was 147 pounds.

On admission, there was moderate glycosuria but no ketonuria. The blood sugar was 238 mgrm. per cent; non-protein nitrogen 33.3; Wassermann test negative. The hæmoglobin was 70 per cent; red blood cells 3,510,000 per mm.; colour index 0.89; white blood cells 7,700 per mm., neutrophiles 50 per cent (mature forms 48, young forms 2), lymphocytes 50 per cent. The red cells did not appear to be abnormal as regards their size, shape or staining properties.

The patient made satisfactory improvement on diet without insulin. At the time of her discharge from the hospital on June 13, 1931, the 24-hour urine was sugar-free and acetone-free; the blood sugar, fasting, was 109 mgrm. per cent; 2½ hours after breakfast it was 145 mgrm. per cent. The daily diet consisted of 140 grm. of carbohydrate, 90 grm. of fat and 75 grm. of protein (1670 calories).

She was re-examined in the out-patient clinic on several occasions. The urine remained sugar-free and the blood sugar normal. Her weight increased to 162 lbs. The carbohydrate value of the diet was raised to 180 grm. When observed on October 9, 1931, she complained of pain and stiffness in the legs. She was asked to report again in 2 months but she neglected to do so.

The next time the patient was seen was on November 12, 1932, when she was re-admitted to the hospital in a seriously ill condition. The clinical picture had changed completely from what it was 11 months previously.

It was ascertained that she had adhered to her diet and continued to be fairly well until June, 1932, when she became readily exhausted, suffered dyspnœa on the slightest exertion; developed loss of appetite and failure of memory. Subsequently, she experienced numbness of her feet and noticed that her ankles and legs were swollen. The general weakness became extreme. About 6 weeks before entering the hospital she was nauseated after meals. There followed occasional attacks of vomiting. Later, she would vomit after every attempt at taking food. There was no thirst or polyuria. Her relatives had remarked upon the change in the appearance of her skin.

Physical examination revealed slight generalized œdema. The skin was dry and presented an obvious icteroid tint. The scleræ showed no yellowish discoloration. The pupils and eye grounds were normal. The tongue was pale, smooth and moist. The respiratory rate and movements were normal. The lungs were somewhat emphysematous. The cardiac rhythm was regular; the apex beat could not be localized. Neither the liver nor the spleen were palpable. There was slight tenderness over the gall bladder. The knee-jerks could be elicited with difficulty. Babinski's sign was positive on the right side, negative on the left side. There was dulling of the vibration-sense below the knees. The joint sense, also, was definitely impaired but the cutaneous sensations appeared to be normal. The walls of the peripheral arteries showed diffuse thickening. The blood pressure was 160/70 mm.

The laboratory findings were as follows: hæmoglobin 28 per cent; red blood cells 1,076,000 per mm.; colour index 1.17; white blood cells 2,465 per mm., neutrophiles 47 per cent (mature forms 45, young forms 2), lymphocytes 53 per cent; reticulocytes 2.2 per cent. The red cells showed anisocytosis, poikilocytosis and polychromasia. Megalocytes were present. The mean diameter of the red cells was 7.9 microns and the cell volume index 1.43. The Van den Bergh test gave a positive indirect reaction, negative direct; serum bilirubin 0.4 mgrm. per cent; icterus index 21.7. The blood sugar was 121 mgrm. per cent and the non-protein nitrogen 25.2. The urine contained no sugar, acetone, albumin, bile or casts, but it did possess a marked excess of urobilin and urobilinogen. Fractional gastric analysis revealed complete absence of free HCl with a maximum total acidity of 13.0 c.c. N/10 per cent. Tests for lactic acid in the stomach contents were negative. The stomach appeared to empty rapidly. The fæces contained neither occult blood nor parasites.

X-ray examination of the gastrointestinal tract disclosed nothing abnormal. An electrocardiogram showed evidence of left ventricular hypertrophy.

The immediate treatment consisted of a transfusion of 450 c.c. of whole blood. This was followed by the intramuscular injection of 2 c.c. of liver extract twice daily. Improvement was prompt. The vomiting and aversion for food disappeared almost at once and the blood count began to rise. A reticulocyte response of 25 per cent occurred. As soon as the stomach became retentive, the use of ventriculin by mouth was substituted for the injections of liver. On a diet of 160 grm. of carbohydrate, 110 grm. of fat and 90 grm. of protein (1990 calories), the urine remained sugar-free and the blood sugar normal. On December 12, 1932, the fasting blood sugar was 97 mgrm. per cent; hæmoglobin 65 per cent; red blood cells 3,410,000 per mm.; colour index 0.85; white blood cells 8,000 per mm., neutrophiles 72 per cent (mature forms 67, young forms 5) and lymphocytes 28 per cent.

This case exemplifies the advisability of the careful study of the diabetic patient with a view to the detection of early signs of pernicious anæmia. While the blood picture of this patient at the time of her first hospital admission was not typical of the latter disease, it was at least suspicious of it. If detailed investigations, such as the measurement of the diameter of the red blood cells, the determination of the cell volume index and the examination of the gastric con-

tents had been carried out then, more deciding evidence might have been obtained and prophylactic treatment instituted. In any event, the diagnosis of pernicious anæmia would have been made sooner than it was, had the patient remained under medical supervision. An interesting observation is that the severe grade of anæmia which existed in this case had no apparent deteriorating effect upon the diabetes.

DISCUSSION

The addition of these three cases to those already on record brings the probable total number of cases of combined diabetes and pernicious anæmia to 79. While this figure represents but a very small proportion of the population of diabetics and subjects of pernicious anæmia, the fact that the concurrent incidence of the two diseases seems to be on the increase, warrants some comment as to a possible association between them. Since no actual proof for or against an etiological relationship is available, any discussion pertaining to the problem resolves itself into the speculative application of relevant data.

The opinion generally expressed by those who have written on the subject of concomitant diabetes and pernicious anæmia is that the phenomenon is but a chance combination and that the two diseases are unrelated etiologically to one another. Root, however, did not subscribe entirely to this view but advanced some interesting comparisons of certain features possessed in common by the two disorders and indicated some of the factors which may predispose to a more frequent combined incidence. He referred especially in this regard to the keener interest in diagnosis at the present time, the longer duration of life brought about by improved treatment and the achlorhydria which is considered to be of fundamental significance in pernicious anæmia and which has been shown to be of frequent occurrence in diabetes. Among other etiological influences mentioned were the age-factor and heredity. No case of the combination has been observed in a young person. They have all occurred during the age period which is usual for the onset of pernicious anæmia, which includes, incidentally, the age which is most common for the development of diabetes. Hereditary and family tendencies are recognized as playing important parts in the etiology of both diseases. That there may be some underlying relationship between them is suggested by a remarkable family history recorded by Joslin. Some of the members of this family had pernicious anæmia, some had diabetes, and one had, in all probability, both conditions. The pancreas, liver and stomach are closely related from the developmental point of view.

Although attention is focussed at present upon gastric dysfunction as the prime causative factor in pernicious anæmia, the observations of Jones and Joyce with regard to gall-bladder infection in this disease should not be overlooked. Gall-bladder disease is regarded as an etiological factor of some importance also in many cases of diabetes in adults. Whether or not any relationship between diabetes and pernicious anæmia can be proved, the matter is of sufficient moment from the practical standpoint, as intimated by Root and demonstrated by the case histories presented in this paper, to justify careful search for evidences of pernicious anæmia in patients with diabetes mellitus and, it may be added, for signs of diabetes in those with pernicious anæmia.

The work of Castle has indicated that the achlorhydria or achylia gastrica which occurs so characteristically in pernicious anæmia is a manifestation of some more fundamental defect whereby the stomach is unable to elaborate from protein, as normally, a substance essential for the maturation of red blood cells. According to the evidence adduced by Bowen and Aaron, Curtis, Ingram, Mason, Rabinowitch *et al.* and Wohl, diminished or absent gastric HCl occurs in some 30 to 40 per cent of diabetics. It appears, moreover, that the tendency to the development of these defects increases with the duration of the diabetes and with the age of the patient. Does this mean that diabetics in virtue of their prolonged existence are prone to develop pernicious anæmia? The answer to this query rests in the results of future observations. The fact that in the majority of cases studied so far the diabetes antedated the anæmia is significant. With regard to the cases in which the onset of the conditions was in the reverse order, that is, where the anæmia preceded the diabetes, some interesting speculations can be advanced. It appears that the secretory power of the stomach is not the only function of this organ which is at fault in pernicious anæmia. Its motor activity is altered as well. This dis-

turbance has been described by Davidson and Gulland as follows: "The emptying rate of the stomach in cases of pernicious anæmia is rapid, both as judged by the disappearance of a test meal or by direct radiographic examination. The stomach may be empty within 30 minutes and is usually so in about an hour. The reason for this appears to depend mainly on the state of the pylorus, which is patulous and atonic . . . . This relaxed state of the pyloric sphincter, which is so commonly present in pernicious anæmia is not found to anything like the same degree in other achlorhydric conditions; in fact, the reverse is frequently seen, namely, pyloric stenosis and a slow emptying rate." This rapid emptying rate of the stomach may provide the foundation for a state of altered carbohydrate metabolism. In a previous communication (1927) attention was directed to a possible relationship between gastric motility and the character of the blood sugar curve following the ingestion of dextrose. The explanation offered for certain abnormal curves obtained in persons with achlorhydria and rapidly emptying stomachs was, presumably, rapid absorption of glucose from the intestine. Recent developments make it necessary to consider another possibility in respect to such cases. Macallum, in 1929, suggested a new factor in the causation of certain cases of diabetes based upon the supposition that a hormone is formed in the intestinal mucosa under the stimulation of sugar, which controls the secretion of insulin by the islet-cells of the pancreas. Constant and excessive action of this hormone might lead to exhaustion of the islets and ultimately to their degeneration and result in diabetes. It seems reasonable to assume that in cases where the stomach allows its sugar-laden contents to rush hurriedly into the intestine, the above-mentioned result would be more likely to occur than where the rate of emptying of the stomach is normal or delayed. On the other hand, it might be argued with equal justification that deficiency or absence of an internal secretion, such as that just alluded to, might lead to the same end-results, namely, lowered carbohydrate tolerance and diabetes due to lack of insulin production through inadequate stimulation of the pancreatic islets. Assuming pernicious anæmia to be a type of deficiency disease due primarily to imperfect functioning of the gastric mucosa, the existence of other secretory defects in the digestive tract might be surmised, especially as regards the duodenum, the mucous membrane of which is directly continuous with that of the stomach. The recent work of Laughton and Macallum has helped to substantiate the conception regarding the existence of a duodenal hormone with a function such as that referred to above.

That a disturbance of sugar metabolism may occur as a result of anæmia *per se* was postulated many years ago. Claude Bernard, in 1877, made the original observation that hyperglycæmia resulted from repeated bleeding of dogs. Later, Strauss demonstrated an increased excretion of sugar in two diabetics following blood-letting. Isaac and Handrick found the blood sugar concentration to be raised in pernicious anæmia and observed also an unusual distribution of sugar as regards the red blood cells and the plasma. Johnsson, in 1922, thought that the high fasting blood sugar which he found in cases of anæmia was related to the degree of severity of the anæmia. Meulengracht and Iversen reported in 1925 a high fasting blood sugar as well as other evidence of defective carbohydrate tolerance in patients with pernicious anæmia during severe relapse. They believed these defects to be dependent not on the anæmic state itself but rather on an underlying intoxication. Contrary to the findings of these observers, Blumenthal and Neuburger in the same year found no regular change of the blood sugar in pernicious anæmia and no connection between the severity of the anæmia and the blood sugar level.

While a heightened blood sugar concentration and an abnormal response to the sugar tolerance test appears to occur in many patients with pernicious anæmia, no adequate explanation has been offered regarding the mechanism of their production. It is conceivable that anæmia of severe grade might produce a deleterious effect upon the functional activity of certain organs, such as the pancreas, ductless glands and liver, which are concerned with the processes of carbohydrate metabolism. The liver is known to be the seat of pathological change in pernicious anæmia which may conceivably interfere with its glycogenic function. The experience of Harrop and Barron with the bile excretion test indicates the existence of a functional hepatic disturbance in this disease. Schumann explained the development of diabetes in pernicious

anæmia on the grounds of the spread of infection from the intestine to the pancreas with resulting damage to this organ.

The announcement by Blotner and Murphy, in 1929, of a blood sugar lowering effect, analogous to that produced by insulin, following the oral administration of liver was regarded for a time as affording a possible link between diabetes and pernicious anæmia. However, any expectations in this direction had to be abandoned in view of the failure of confirmation of their results by numerous other observers. Riddle, in 1930, reported the occurrence of a decrease in the blood sugar concentration of patients with pernicious anæmia during the early phase of remission brought about by treatment or occurring spontaneously. He attributed the phenomenon to a metabolic readjustment accompanying the onset of remission rather than to a direct effect of liver preparations on sugar metabolism. Goldhamer, in 1932, corroborated these observations regarding the decline in the blood sugar values during early remission and found that the minimum blood sugar level occurred at the time when the immature red blood cells (reticulocytes) were at their maximum in the peripheral circulation. He demonstrated, also, that ventriculin possessed no specific insulin-like properties when taken by mouth.

SUMMARY

Including the 3 cases reported in this paper, the total number of examples of combined diabetes mellitus and pernicious anæmia on record is 79. Obviously, the prevalence of this particular association of diseases is increasing. Whether this is merely a matter of chance, the opportunities for such concurrence being enhanced by prolongation of life due to effective treatment of the two diseases or whether any conditions which may result from or accompany the one disease predisposes to the development of the other is undecided at present. The observation that in the majority of instances the diabetes preceded the anæmia is probably significant of some relationship. While it is difficult to extract from the maze of data relative to the problem any circumstantial evidence in favour of an actual correlation between the two disorders, there are some features which seem to stand out as probabilities. Certain disturbances of gastrointestinal function may provide, theoretically at least, a connecting link between them.

Correlating the tendency to low or absent gastric HCl in diabetes with the fact that achlorhydria is of prime importance in pernicious anæmia affords some explanation why there may be a tendency for the latter disease to develop as a complication or concomitant of the former. The actual rôle of the so-called duodenal hormone in carbohydrate metabolism has not been definitely established, but assuming that it does exist and that its function is to stimulate the secretion of insulin by the islet cells of the pancreas as postulated by Laughton and Macallum, lowered carbohydrate tolerance might be caused either by excessive production of this hormone or by its deficiency. The latter eventuality is suggested as a possible accompaniment of the achylia gastrica which occurs in pernicious anæmia. Also, the rapid emptying rate of the stomach in pernicious anæmia may allow for excessive stimulation of the hormone leading to fatigue and ultimate functional breakdown of the pancreatic islets in accordance with the theory of diabetes advanced by Macallum. These factors acting in the presence of probably liver disability, together with, perhaps, the rapid absorption of sugar from the intestinal tract, supply a sequence of circumstances which well might lead to a state of abnormal carbohydrate metabolism.

In any event, the facts adduced from a review of the recent literature relative to the clinical association of diabetes and pernicious anæmia suggest that gastric analysis should be included in the routine investigation of patients with diabetes mellitus and that careful blood examinations should be made from time to time for evidences of the advent of pernicious anæmia, especially in those patients with low or absent gastric HCl. Likewise, patients with pernicious anæmia should be examined for signs of disturbed carbohydrate metabolism.

The author wishes to express his grateful appreciation to Dr. J. R. N. Childs, London, and to Dr. Homer McLay, Aylmer, for the opportunity of studying the patient referred to as Case 1 and for permission to include the notes in this paper; also to Dr. Howard F. Root, Boston, who kindly submitted for perusal some unpublished data.

Note.—An exhaustive bibliography has been prepared in connection with this paper, which may be had from the author direct.

INFESTATION WITH *STRONGYLOIDES STERCORALIS* ASSOCIATED WITH SEVERE SYMPTOMS*

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INFESTATION with *Strongyloides stercoralis* is common in the tropics and relatively frequent in the subtropics. At intervals isolated cases are reported from widely scattered areas of the temperate zone. The condition is extremely rare in Canada. Because of this latter fact and in view of the severe symptoms which resulted from the infection a report of this case is of interest.

CASE HISTORY

Miss N., a staff nurse, in a local hospital was admitted as a patient in June, 1932. The patient had been a resident of Canada since birth and for some years previous to her illness had not been outside the prairie provinces.

In May, 1931, she suffered from an attack of diarrhœa which lasted several days. In September of the same year a severe diarrhœa developed, associated with nausea, epigastric distress and urticaria. At the time neither blood nor mucus was noted in the stool. This attack lasted three weeks. Subsequently, intermittent attacks of a similar nature recurred at intervals of two to three weeks. Within the year she had lost twelve pounds in weight and because of general debility was obliged to cease work.

For ten weeks following her admission to hospital all examinations failed to disclose the nature of the trouble. Basal metabolic rates, roentgenograms, gastric and urine analyses revealed nothing abnormal. Microscopic examination of the fæces showed the presence of blood and pus, but no specific organism was isolated by culture methods. A secondary anæmia, associated with eosinophilia, was present: hæmoglobin 58 per cent; erythrocytes 2,100,000, leucocytes 7,200, with 9 per cent eosinophils. The patient developed an intermittent and slight variation in temperature; however agglutination tests for *Br. melitensis, Br. melitensis abortus, B. dysenteriæ* and *B. paratyphosus* were negative.

The attacks of urticaria recurred more frequently, some œdema of the feet developed, and the diarrhœa became intractable. The patient was markedly neurasthenic and by August 15th she had lost forty pounds in weight, and the prognosis appeared serious. At this time a further careful microscopic study of the stools was made. The patient was given a drastic purgative, and a subsequent examination of the fæces revealed the presence of the eggs of *Strongyloides stercoralis.* These eggs hatched *in vitro.* At intervals the motile rhabditiform larvæ were also noted in the stools. The appearance of abundant larvæ in the fæces coincided with the outbreaks of urticaria.

Under the direction of Dr. H. D. Kitchen thymol was administered, and the patient showed immediate improvement. In three weeks the stools were normal in consistency, and careful examination failed to disclose the presence of any of the parasites. The œdema disappeared, and there was no recurrence of the urticaria. No further epigastric distress was noted, the neurasthenic symptoms rapidly abated, the appetite improved, and within one month the patient had regained her normal health.

COMMENT

While this patient responded favourably to medication with thymol, and evidently the parasite was eradicated, yet several observers claim that frequently no relief, or at best but a temporary beneficial result, is obtained by the use of this drug. In 1928 DeLangen[1] suggested the use of gentian violet, since the adult parasitic worm is susceptible to its toxic effect. The dye is given in coated tablets by mouth over a period of several days. Faust[2] reports the beneficial results obtained in 200 patients suffering from strongyloidosis, to whom the dye had been administered. He speaks highly of this novel method of treatment.

The *Strongyloides stercoralis* resembles the hookworm in the method of invasion. As a filariform larva it penetrates the skin or mucosa, and then enters the venous circulation, after passing through the heart and invading the alveoli of the lung it migrates to the epiglottis and thence to the intestinal tract. Direct infestation may also occur. After the parasite enters the digestive tract it either attaches itself to the mucosa of the intestine, usually in the duodenum and jejunum, or the larva enters the crypts and develops into an adult worm; the female then deposits her eggs.

Two types of development are known. The eggs commonly hatch in the intestine and are passed in the fæces as rhabditiform larvæ. These larvæ may become metamorphosed into the filariform larvæ, which is the infective stage of the parasite, or they may become transformed into male and female worms. The eggs from these females hatch as rhabditiform larvæ, which after a few days moult and change to the infective filariform larvæ.

Following infestation of the host a catarrhal inflammation of the invaded mucosa results, and later, as Ophüls[3] points out, a colitis may

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also develop. The rhabditiform embryos as a rule are passed in the fæces, but on occasion they undergo transformation in the lower intestine into the filariform larvæ forms; these larvæ then penetrate the colonic mucosa, giving rise to the colitis. No evidence in this case was forthcoming either as to the origin or the route of infestation; however, the patient was exposed to the hazards of infection pertaining to her profession as a nurse in a large general hospital.

Some investigators have considered the outbreaks of urticaria in strongyloidosis to be the result of the direct irritation produced by the larvæ when they penetrated the skin; this irritation, which is characterized by an intense erythema, recurs during reinfection. The successive attacks of a general urticaria from which this patient suffered quite evidently were not the result of infection through the skin, but were, apparently, associated with reinfection through the colon.

Massive infestation with *Strongyloides stercoralis* may result in death. In 1876 Normand[4] reported the deaths of five French soldiers in Cochin China from this cause, and fatal cases in temperate zones have been noted by Ophüls[5] and by Ginsberg.[6] However, not all persons infected with the parasite develop symptoms. Moreover, the infestation may be associated with other infective agents as the cause of a diarrhœa or dysentery, hence some uncertainty exists regarding the pathogenic power of this parasite.

In the case here reported the patient presented the symptoms characteristic of a severe *Strongyloides stercoralis* infestation—intermittent attacks of diarrhœa associated with neurasthenia, epigastric distress and recurring urticaria together with progressive anæmia, some œdema, and extreme emaciation. The presence of the parasite was finally disclosed, but exhaustive examination failed to reveal any concomitant infection, and the history of the case supports the considerable accumulated evidence that strongyloidosis may give rise to severe symptoms.

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THE ANATOMY AND PHYSIOLOGY OF THE CORONARY CIRCULATION*

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ANY good drawing of the heart such as that in Spalteholz' Anatomy will serve to recall to our minds the elementary points in connection with the anatomy of the coronary arteries. There are normally two main coronary arteries, the right and the left, both arising from the aorta in the sinuses of Valsalva. They are both ensheathed in a liberal amount of fat as they course over the pericardial surface. The right coronary has its origin from the anterior part of the aorta just behind the anterior cusp of the aortic valve. It emerges on the anterior surface of the heart between the roots of the aorta and the pulmonary artery. The main trunk courses downwards over the surface of the right ventricle, close to the auriculoventricular sulcus, rounds the acute margin of the heart and finally runs towards the apex where it terminates in the wall of the left ventricle. Its branches are numerous and variable and need not concern us; suffice it to say it supplies most of the wall of the right ventricle and the right auricle, and sends deep branches into the anterior part of the interventricular septum. The conducting system of the heart is supplied mostly by the right coronary. The left coronary arises from the left posterior sinus of Valsalva, and emerges on the surface under cover of the left auricular appendage, where it soon divides into two large and more or less constant trunks, the descending and circumflex branches. The descending branch runs downwards along the anterior

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surface of the heart in the interventricular furrow. It rounds the apex and ascends for a short distance up the other side. It gives off a few branches to supply the adjacent portion of the wall of the right ventricle, sends deep twigs into the interventricular septum, and supplies the apex of the heart. This branch is the most frequent site of coronary thrombosis. When it is occluded infarcts develop near the apex. The other main branch of the left coronary is the circumflex, which courses horizontally to the left in the auriculoventricular sulcus and then descends to spend itself in small branches over the wall of the left ventricle. Not infrequently one finds small accessory coronary arteries springing from the aorta close beside the mouth of the main vessel. These accessory twigs, when present, may stand the heart in good stead in the event of the main trunks becoming occluded. Several authors have reported cases with but a single coronary artery.

Histologically, the main trunks of the coronary arteries are stout-walled, muscular vessels, with a relatively heavy medial coat of musculoelastic tissue similar in character to that possessed by the peripheral arteries. These are the superficial divisions of the coronary vessels. The deeper divisions are also important. The superficial branches all along their courses send off twigs which plunge into the heart muscle at right angles to the surface. These twigs spend themselves in the capillary beds, which are richest in the middle third of the wall. Narrowing or occlusion of these fine branches produces small patches of scar tissue in the myocardium, producing what the clinicians call chronic degenerative myocarditis. In pathology we have been in the habit of calling it fibrosis of the heart.

Let us consider now what compensatory mechanisms are available in the event of one coronary becoming blocked. It must first be remembered that there can be no sharp line of demarcation between the supply of the right and left coronaries, since not only do their branches overlap, but also profuse and abundant anastomoses leave a wide border line which is supplied by both vessels. Early anatomists thought there were no anastomoses in the coronary circulation, else why should infarcts occur? Latterly, however, it has been amply demonstrated that a rich anastomosis occurs both in the capillary and precapillary as well as in the superficial circulation. Gross believes the heart is the richest organ in the body as regards arterial anastomoses. There are no end-arteries as was formerly held. How, then, is it possible to explain the so frequent occurrence of infarcts and patchy nutritional disturbances in the heart muscle, and why is disease of the coronary arteries such a menace to the life of the individual?

The anastomoses increase with age. In the average young adult's heart the intricate anastomoses are all in active function, but are not prepared to act suddenly as entirely adequate compensatory agents. A certain amount of compensation does occur, and the infarcted area is much smaller than the total region supplied by the occluded vessel. If the obliteration is gradual, like that resulting from arteriosclerotic changes, the anastomotic vessels become sufficiently dilated to cope with the situation. The anastomoses become more and more efficient as a person grows older. This is a very important point to grasp, because it means that in the 3rd or 4th decades, occlusion of a single coronary artery is a more serious affair than in the later decades. People dying of coronary disease in the later decades of life have usually suffered occlusion of more than one main coronary artery. The factors which determine the formation of an infarct in the myocardium are then:— (1) the size and location of the obliterated vessel; (2) the duration and rapidity of the occlusion; (3) the age of the individual. And to these we may now add a fourth factor, namely the condition of the blood. If anæmia is present, this favours infarction.

We need not concern ourselves with the veins of the heart, save to mention the veins of Thebesius. These are short, small-calibre vessels which arise in the myocardium and empty directly into the chambers of the heart. Their normal function is to provide a handy exit for a part of the blood which has been conveyed to the myocardium by the coronary vessels. Wearn believes that these vessels assume considerable importance in the event of coronary occlusion, when the blood flow through them becomes reversed, and they act as tiny arteries supplying a certain amount of blood to the myocardium.

Experimental ligation of the coronary arteries has been carried out by several investigators, mostly on dogs. Their results are at consider-

able variance one with another, but it is now generally established that ligation of either the descending or circumflex branch of the left coronary may be accomplished without grave risk to the life of the animal. Ligation of the right coronary is productive of about 50 per cent mortality, probably because the blood supply to the conducting mechanism suffers greater interference. Ligation of a coronary artery produces indications of great pain, which, so far as can be determined, seems analogous to the pain of angina pectoris. Anginal pain is now generally conceded to be due to anoxæmia of the myocardium. The oxygen needs of the myocardium are supplied by the blood delivered through the coronary circulation. If the coronary vessels are narrowed or occluded the heart suffers from an inadequate blood supply and pain stimuli are set up. This state of affairs is especially prone to occur when the heart is thrown into increased activity, in exercise, emotional excitation, or after a heavy meal. Pain originating in the heart has a marked tendency to be referred and may have a wide distribution, not only in the chest, neck and arms but in the interscapular area and epigastrium.

As regards the physiological factors which control the coronary flow, the blood pressure is the most important. A two-fold increase in blood pressure produces a four-fold increase in the coronary flow. The average volume of blood which flows through the coronaries of a man at rest is 140 c.c. per minute. This is increased up to ten times in exercise.

The coronary arteries fill during diastole, hence the diastolic blood pressure is of the greatest significance in regulating the coronary flow. Should the diastolic blood pressure be depressed, for any reason, the myocardium suffers in consequence.

The coronary arteries receive a rich innervation from the autonomic nervous system. Constrictor fibres arise from the vagus and an antagonistic or dilator innervation comes from the sympathetic system. It is to be expected, therefore, that the coronary circulation, like that in the peripheral vessels and the bronchi, is subject to the common disorders of that delicately balanced, dual nervous mechanism. Though there is no experimental proof for the supposition, it seems not improbable that the coronary arteries may be subject to purely functional constrictions through spastic contraction of the media. The question of a neurogenic etiology for angina pectoris has been toyed with by medical philosophers of the day, but it remains a moot question because it is so difficult to investigate. If the theory is sound we would expect a higher incidence of angina pectoris amongst sympatheticotonic individuals, but that such is the case has never been commented upon as far as I am aware.

The dramatic effect of amyl nitrite on anginal pain has been ascribed by many to relief of a spasm of the coronary arteries. Others believe the drug acts by reducing the blood pressure through peripheral vasodilation, thus lessening the work of the heart and reducing its demand for oxygen.

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FIGHT OF BLUE DYE AND CYANIDE POISON DESCRIBED —The warfare and strategy that go on in the human body when methylene blue is called in to fight poisonous cyanides were revealed in a report by Dr. William B. Wendel of Washington University School of Medicine. Doctor Wendel's study showed that methylene blue can win the fight for life against the poison only when the dose of cyanide is not great. Successful use of the dye as antidote in a case of cyanide poisoning was reported last autumn by Dr. J. C. Geiger, director of public health of San Francisco. The antagonistic action of the dye for cyanides has been observed by a number of scientists. Mrs. Matilda M. Brooks of the University of California claims to have first suggested its use as an antidote in poisoning and suicide cases. Cyanides cause death by suffocation. Methylene blue fights cyanides by converting some of the oxygen-carrying hæmoglobin of the blood into a new chemical compound, methemoglobin. This new compound is able to force the cyanide out of combat by uniting with it to form the chemical union, cyanmethemoglobin, which is harmless itself, and which keeps the cyanide from interfering with the vital, oxygen-carrying activity of the rest of the blood hæmoglobin. The difficulty is that when very much of the cyanide has got into the body, too much hæmoglobin is mobilized by methylene blue for the fight against the enemy, and not enough is left to carry on the important job of feeding oxygen to the tissues; so that even if all the poison of a large dose were forced into chemical union with methemoglobin, the fight would nevertheless be lost and death result from lack of oxygen. Doctor Wendel found that it would take nearly two-thirds of all the hæmoglobin in the body to overcome four deadly doses of the poison.—*The Diplomate*, 1933, **5**: 186.

THE VALUE OF MEDICINAL CHARCOAL (CARBO MEDICINALIS C.F.) IN MEDICINE

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FOR several years we have been in the habit of recommending the use of charcoal as a temporary antidote in cases of poisoning, but in practice we found no charcoal of which we could be certain. This problem was discussed two or three years ago with Mr. Harrison of Ayerst, McKenna and Harrison, and we wish to acknowledge his assistance in obtaining samples for testing. Finally a sample of German medicinal charcoal was obtained. This had such valuable adsorbent properties *in vitro* that we were led to suggest its inclusion in the Canadian Formulary.

Authorities are agreed that the therapeutic action of charcoal is due to its adsorption of gases or toxins which are produced in abnormal amounts in the alimentary tract. Its value as an antidote for poisoning by alkaloids, by heavy metals (lead, mercury, silver, arsenic, etc.) or such vegetable poisons as those produced by fungi, also lies in its adsorptive power. In spite of remarkable results recorded of the use of charcoal in Asiatic cholera, dysentery, diarrhœa and dyspepsia, clinicians in this country have not used it extensively. The failure to provide a medicinal charcoal of high activity in the British and American Pharmacopœias, and to formulate such tests as would ensure an excellent charcoal for medicinal purposes may account for the flood of useless charcoals now on the market.

It is recognized that difficulty is encountered when one attempts to formulate tests which will show that the charcoal under investigation is of the proper type for medicinal use. Such tests as the moisture test (Brindle),[1] the benzoic acid test (Miller),[2] the iodine test (Joachimoglu),[3] the methylene blue test and the mercuric chloride test (Wiechowski),[4] as employed in the German Pharmacopœia, give varying results, yet each test will more or less identify the charcoal most active medicinally. The methylene blue test applied in this laboratory to Nuchar No. 2, Nuchar 00, Darco, Norit, Purit, a number of wood charcoals, showed that none of these were of medicinal value. The same was true of several samples of animal charcoal which were in the laboratory. The only charcoal which was found to meet the methylene blue and mercuric chloride tests was the Carbo Medicinalis of the German Pharmacopœia. Further, when charcoal upon which different drugs or chemicals are adsorbed is placed in the alimentary tract, such substances as iodine (Joachimoglu) are readily split off and become available to the body, whereas methylene blue is so tenaciously held that none of it leaves the charcoal during its passage through the gut (Wiechowski). It has been shown by Dingmanse and Laquer[5] that when such poisons as mercuric chloride (500 mg.) are placed in a pig's stomach for 10 minutes, 47 per cent is held by the tissues. If activated charcoal is added at the same time, only 4 per cent remains in the tissues. In the alkaline portion of the intestine, charcoal does not retain the mercuric chloride as firmly as in the stomach. When 2 grams of charcoal containing 117 mg. of mercuric chloride were placed in 1 metre of pig intestine for ¾ of an hour, about 9 per cent of the salt was taken up by the tissues. Even *in vitro* the acidity of the solution enhances the adsorptive power of the charcoal. In the case of strychnine, under similar conditions, only a trace remained in the stomach and none entered the intestine.

The experiments of J. Taisne (See Table I.) on feeding poisons which had been shaken up with charcoal show clearly that even such charcoal as he was able to obtain in 1906 was quite effective in preventing poisoning.

While the experiments of Wiechowski on animals further demonstrated that animal charcoal was an excellent antidote for poisons, the clinical work of O. Adler[6] is possibly more convincing to clinicians. In his clinic treatment with an excellent medicinal charcoal was used in some 50 cases of poisoning. In 21 cases where death would presumably have occurred, the administration of charcoal saved the patient. These include 7 cases of poisoning with phosphorus, 3 with morphine, 2 with corrosive sublimate, potassium chlorate and lysol, 1 with arsenic, veronal and pantopon, absinthe, mercury, and 2 with some unknown food substance.

The investigations of Adler were not limited

TABLE I.

Number of experiments	*Weight of rabbits*	*Amount of poison administered*	*Amount and nature of charcoal administered*	*Result of administration*
		Strychnine sulphate	Animal charcoal activated	
25	2020	3 mg.		Died
26	2420	3 mg.	20 grams	Lived
27	2530	5 mg.	5 grams	Lived
28	2340	10 mg.	10 grams	Lived
29	2150	20 mg.	20 grams	Lived
30	2120	50 mg.	40 grams	Lived
		Copper sulphate		
31	1650	1 gram		Died
32	1450	1 gram	40 grams	Lived
33	1450	1 gram		Lived
34	1430	1 gram	20 grams	Lived
		Bichloride of mercury		
35	1650	200 mg.		Died
			Poplar charcoal	
36	1500	200 mg.	20 grams	Lived
37	1580	500 mg.	30 grams	Died
38	1650	500 mg.	40 grams	Lived
		Fowler's solution	Animal charcoal activated	
39	1520	10 c.c.		Died
40	2040	10 c.c.	75 grams	Lived

to poisoning cases alone. In the clinic, treatment of gastroenteritis and acute enteritis with charcoal resulted in a rapid disappearance of the symptoms. The quantities given were small, 3 grams two or three times daily, or sometimes 5 grams twice daily. This amount was mixed with water and thus swallowed. One treatment with 5 grams of charcoal was sufficient to relieve and cause complete disappearance of a violent diarrhœa. In cases where the urine and fæces contained large quantities of indican, the administration of charcoal resulted in its disappearance. The treatment of typhoid was not successful.

The literature contains many other references where charcoal has proved of value in poison cases. It must be borne in mind that although in some instances where experiments *in vitro* have shown charcoal has not a marked affinity for a drug, in the alimentary canal under different conditions it has apparently prevented its rapid absorption and thus diminished the symptoms and effects.

It is evident that a medicinal charcoal which will meet the requirements laid down in the Addendum of the Canadian Formulary (which are essentially those of the German Pharmacopœia) is bound to be an excellent charcoal as an antidote for many poisons. It may also be of much value in the treatment of flatulency and some intestinal disorders.

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THE VALUE OF MEDICINAL CHARCOAL (CARBO MEDICINALIS C.F.) IN MEDICINE

BY G. H. W. LUCAS AND V. E. HENDERSON

Department of Pharmacology, University of Toronto

Toronto

FOR several years we have been in the habit of recommending the use of charcoal as a temporary antidote in cases of poisoning, but in practice we found no charcoal of which we could be certain. This problem was discussed two or three years ago with Mr. Harrison of Ayerst, McKenna and Harrison, and we wish to acknowledge his assistance in obtaining samples for testing. Finally a sample of German medicinal charcoal was obtained. This had such valuable adsorbent properties *in vitro* that we were led to suggest its inclusion in the Canadian Formulary.

Authorities are agreed that the therapeutic action of charcoal is due to its adsorption of gases or toxins which are produced in abnormal amounts in the alimentary tract. Its value as an antidote for poisoning by alkaloids, by heavy metals (lead, mercury, silver, arsenic, etc.) or such vegetable poisons as those produced by fungi, also lies in its adsorptive power. In spite of remarkable results recorded of the use of charcoal in Asiatic cholera, dysentery, diarrhœa and dyspepsia, clinicians in this country have not used it extensively. The failure to provide a medicinal charcoal of high activity in the British and American Pharmacopœias, and to formulate such tests as would ensure an excellent charcoal for medicinal purposes may account for the flood of useless charcoals now on the market.

It is recognized that difficulty is encountered when one attempts to formulate tests which will show that the charcoal under investigation is of the proper type for medicinal use. Such tests as the moisture test (Brindle),[1] the benzoic acid test (Miller),[2] the iodine test (Joachimoglu),[3] the methylene blue test and the mercuric chloride test (Wiechowski),[4] as employed in the German Pharmacopœia, give varying results, yet each test will more or less identify the charcoal most active medicinally. The methylene blue test applied in this laboratory to Nuchar No. 2, Nuchar 00, Darco, Norit, Purit, a number of wood charcoals, showed that none of these were of medicinal value. The same was true of several samples of animal charcoal which were in the laboratory. The only charcoal which was found to meet the methylene blue and mercuric chloride tests was the Carbo Medicinalis of the German Pharmacopœia. Further, when charcoal upon which different drugs or chemicals are adsorbed is placed in the alimentary tract, such substances as iodine (Joachimoglu) are readily split off and become available to the body, whereas methylene blue is so tenaciously held that none of it leaves the charcoal during its passage through the gut (Wiechowski). It has been shown by Dingmanse and Laquer[5] that when such poisons as mercuric chloride (500 mg.) are placed in a pig's stomach for 10 minutes, 47 per cent is held by the tissues. If activated charcoal is added at the same time, only 4 per cent remains in the tissues. In the alkaline portion of the intestine, charcoal does not retain the mercuric chloride as firmly as in the stomach. When 2 grams of charcoal containing 117 mg. of mercuric chloride were placed in 1 metre of pig intestine for ¾ of an hour, about 9 per cent of the salt was taken up by the tissues. Even *in vitro* the acidity of the solution enhances the adsorptive power of the charcoal. In the case of strychnine, under similar conditions, only a trace remained in the stomach and none entered the intestine.

The experiments of J. Taisne (See Table I.) on feeding poisons which had been shaken up with charcoal show clearly that even such charcoal as he was able to obtain in 1906 was quite effective in preventing poisoning.

While the experiments of Wiechowski on animals further demonstrated that animal charcoal was an excellent antidote for poisons, the clinical work of O. Adler[6] is possibly more convincing to clinicians. In his clinic treatment with an excellent medicinal charcoal was used in some 50 cases of poisoning. In 21 cases where death would presumably have occurred, the administration of charcoal saved the patient. These include 7 cases of poisoning with phosphorus, 3 with morphine, 2 with corrosive sublimate, potassium chlorate and lysol, 1 with arsenic, veronal and pantopon, absinthe, mercury, and 2 with some unknown food substance.

The investigations of Adler were not limited

TABLE I.

Number of experiments	*Weight of rabbits*	*Amount of poison administered*	*Amount and nature of charcoal administered*	*Result of administration*
		Strychnine sulphate	Animal charcoal activated	
25	2020	3 mg.		Died
26	2420	3 mg.	20 grams	Lived
27	2530	5 mg.	5 grams	Lived
28	2340	10 mg.	10 grams	Lived
29	2150	20 mg.	20 grams	Lived
30	2120	50 mg.	40 grams	Lived
		Copper sulphate		
31	1650	1 gram		Died
32	1450	1 gram	40 grams	Lived
33	1450	1 gram		Lived
34	1430	1 gram	20 grams	Lived
		Bichloride of mercury		
35	1650	200 mg.		Died
			Poplar charcoal	
36	1500	200 mg.	20 grams	Lived
37	1580	500 mg.	30 grams	Died
38	1650	500 mg.	40 grams	Lived
		Fowler's solution	Animal charcoal activated	
39	1520	10 c.c.		Died
40	2040	10 c.c.	75 grams	Lived

to poisoning cases alone. In the clinic, treatment of gastroenteritis and acute enteritis with charcoal resulted in a rapid disappearance of the symptoms. The quantities given were small, 3 grams two or three times daily, or sometimes 5 grams twice daily. This amount was mixed with water and thus swallowed. One treatment with 5 grams of charcoal was sufficient to relieve and cause complete disappearance of a violent diarrhœa. In cases where the urine and fæces contained large quantities of indican, the administration of charcoal resulted in its disappearance. The treatment of typhoid was not successful.

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DIAPHRAGMATIC HERNIA

BY W. H. DICKSON, M.D., C.M., F.R.C.P.(C.),

Departments of Radiology, University of Toronto and Toronto General Hospital, Toronto

WHEN a review is made of the literature upon diaphragmatic hernia published within the last two decades and more particularly during the last five years the impression is obtained that we are dealing with a new pathological condition. Only two of all the authors in these voluminous papers make note of the fact that Ambroise Paré, in 1610, reported this lesion twice.

From 1610 to 1908 ten cases were recognized before autopsy. Griffin,[1] in 1912, collected the reports of 650 cases, of which only 15 were correctly diagnosed during the patient's lifetime. Coincident with the application of radiology to the investigation of the gastro-intestinal tract and increased accuracy in interpretation, all the varieties of diaphragmatic hernia have been shown to be of frequent occurrence rather than rare autopsy findings. Breitner,[2] in 1921, reported 44 cases, only 6 of which had been recognized without the aid of radiology. Carman and Fineman,[3] in 1924, reported a series of 17, of which 15 were diagnosed by radiology. In 1925, Morrison[4] reported his series of 42, all recognized by radiological investigation, in 3,500 routine gastro-intestinal examinations. Ritvo,[5] in 1930, presented his series of 60 cases, all discovered during routine radiological investigation in 8,000 cases at the Boston City Hospital. In our series of 206 cases, diagnosed in the Radiological Department of the Toronto General Hospital during the last 14 years, not a single case of hernia of the stomach through the hiatus œsophagi was recognized before the radiological examination. In the types other than the one mentioned above 8 per cent were sent for investigation, with either a provisional or definite diagnosis of diaphragmatic hernia.

In 1931, Hedblom[6] collected reports of 1,003 cases published in the period from 1900-31, of which the diagnosis by radiological examination was most accurate, and if a graph is made of the increasing accuracy of interpretation by radiological examination during this period and the increasing number of correct diagnoses of the cases collected by Hedblom, the two curves practically coincide. From the above, it will be readily seen that unless a radiological examination is carried out, it would be almost impossible to arrive at even a reasonable number of correct diagnoses in these lesions. The explanation of this is not difficult. No symptoms may be present, or they may be so slight that the clinician will not have his attention called to them. In many cases it is not the gastro-intestinal tract primarily that gives rise to the patient's ill health, but increased thoracic pressure due to displaced abdominal viscera in the thorax, setting up cardiac and respiratory embarrassment. It is to these symptoms that attention is directed and accordingly an investigation of the chest rather than the abdomen is undertaken.

Diaphragmatic hernia is a protrusion of any of the abdominal contents through an opening in the diaphragm into the thoracic cavity. Lacher[7] states that every abdominal organ, except the genitalia, the rectum, and the bladder has been present in the thorax at least once in these hernias. In hernia through the diaphragm it could be possible to have the reverse occur, that is a displacement of the thoracic viscera into the abdomen, and still classify it under this heading. This rarely if ever happens. The negative pressure in the thorax tends to draw or suck the abdominal contents into the thorax; the weight of the abdominal viscera tends to displace the lighter thoracic organs; and the fixation of the thoracic viscera militates against displacement into the abdomen.

The classification given by Woolsey[8] we consider the best, and is as follows:

1. Congenital. (a) False (b) True
2. Acquired. (a) False (b) True
3. Traumatic.

Harrington[9] states that the congenital and acquired types occur through (1) the hiatus pleuro-peritonalis, or foramina of Bochdalek; (2) the dome of the diaphragm; (3) the hiatus

œsophagi; (4) the foramina of Morgagni; (5) and any embryonic fusion point of the diaphragm. The traumatic type of direct injury, such as gunshot or stab wound may occur anywhere; the traumatic type due to indirect violence usually occurs at an embryonic fusion point.

The symptoms of the lesion will vary with the size and site of the hernial opening, the viscus or viscera displaced into the thorax, the amount of encroachment on or displacement of the thoracic viscera by the abdominal contents, any incarceration, stasis, or obstruction that may be present, and any superimposed pathological change, such as ulceration or perforation at the point of pressure of the hernial ring. A hydro—or pyo-pneumo-thorax, or mediastinitis, arising from the latter may also cloud the picture.

Hernia of the stomach through the hiatus œsophagi may exist throughout life without giving rise to any symptoms, if the herniated portion is small. The larger hernia of this type, with 10 to 50 per cent of the stomach in the thorax, gives vague symptoms. Pain in the epigastrium, of a dull aching character, is the most common, seldom radiating, though a few of our patients stated it went through to the back. Its time of occurrence varies greatly in relation to the taking of food. The majority of patients stated it occurred as soon as food was taken or immediately afterward. In one case the first few mouthfuls started the pain, and if the patient walked about for a few moments the pain disappeared, only to return at the end of the meal. The duration of the distress is shortened by assuming a sitting or standing position after meals, increased and lengthened if a recumbent position is maintained. Nausea or vomiting was present in 30 per cent of our cases, the time of occurrence varying from a few minutes up to an hour after eating. One of our cases stated that when vomiting occurred early in the meal, the remainder of the repast could be taken without discomfort. Blood was not present in the vomitus of any of our cases, though other observers have reported its presence. If noted, we would be extremely suspicious of ulceration on the lesser curvature of the stomach at the site of herniation. Dysphagia was present in 6 per cent of our cases, and on account of this symptom the patients had been referred with a diagnosis of cardiospasm or carcinoma of the œsophagus.

When the hernia is through any of the other points, as mentioned by Harrington, on the left side, excepting the foramina of Morgagni, the symptoms will vary with the viscera involved. Definite intestinal disturbance ranging from stasis to complete obstruction may be noted. If the opening is large very little intestinal manifestation will be observed, but disturbed cardiac action and respiratory symptoms will be the predominating ones; on account of the collapsed lung and the gas-filled bowel in the thorax, a clinical picture simulating pneumothorax is presented. On the right side, the decreased lung aeration, dullness at the base, and accompanying cough have led to diagnoses of diaphragmatic pleurisy, cyst of the liver, cyst and tumour of the mediastinum, and bronchiectasis. Hernia through the foramina of Morgagni always involves the colon, and the clinical picture is that of partial or complete obstruction of the large bowel.

The greatest number of these hernias is in the congenital group. Because of this, the possibility of their presence must be remembered from the time of the individual's birth. In not a few cases of death in children we believe congenital heart, pneumonia, tuberculosis, pneumothorax have been given as the cause when the actual factor was a very large congenital diaphragmatic hernia. Differential diagnosis from the clinical standpoint in adults includes gastric ulcer, gastric cancer, cardiospasm, carcinoma of the œsophagus, cholecystitis, cholelithiasis, atypical angina, coronary thrombosis and large gumma in the left lobe of liver. Hernia of the stomach through the hiatus œsophagi constitutes the largest group, our series containing 168 cases. It is both congenital and acquired, the congenital being the more common form; the acquired one is probably potentially acquired at birth as is inguinal hernia; faulty muscular development at the hiatus allows the structures to give way under slight strain. In this type, obesity, heavy lifting, chronic constipation, multiple pregnancy, and tight constricting bands around the abdomen, all are contributory factors. The normal hiatus will scarcely admit the passage of one finger. When hernia has occurred the size increases until in some instances the whole hand may be passed easily through the opening. The degree of dilatation

of the opening will govern to some extent the amount of stomach contained in the hernia. Other factors entering into the size of the hernia will be the amount of gastric contents present, degree of intra-abdominal pressure, and adhesions or incarceration at the site of hernia. We have observed them from the size of a marble up to the whole stomach passed into the thorax.

The relation of the herniated portion of the stomach to the lower end of the thoracic œsophagus varies. When small, it will be noted lying to the left and slightly behind the œsophagus. As it increases in size it appears to come forward, approach the mid-line, and gradually encircle the œsophagus. In the large hernia, displacement of the œsophagus to the right is noted, accompanied by dilatation of the latter. These cases give symptoms simulating œsophageal obstruction.

Radiology offers a greater hope of recognizing the lesion as a hernia of the diaphragm, localizing its site and viscera involved, and frequently differentiating the congenital from the acquired or traumatic form, than all other methods of investigation. The radiological study must be most thorough, from the commencement of deglutition until the stomach has been emptied of the barium meal. In the small hernia no abnormality will be noted in the erect position, and occasionally the same is true of the larger ones, except a small gas bubble parallel with the œsophagus and impinging upon it. The enlarged hiatus in the diaphragm will also be visualized. If this is the only position used during examination many of these lesions will be overlooked. In the larger types in the erect position the fundus of the stomach may be seen filled with gas above the diaphragm. Careful observation in the prone position will demonstrate the hernia filled with gas, barium and secretion above the diaphragm. Some cases fill only in the supine or left oblique horizontal, and all of these positions should be assumed under the fluoroscope. When the hernia is completely filled with barium, it will be seen as a small, round, or oval shadow above the diaphragm, and marked constriction is noted at the site of the hernial ring, and in this constriction rugæ of the stomach will be noted. This is important as it demonstrates the continuity of the stomach above and below the diaphragm. The hernia lies slightly to the left of the mid-line, but closer to it than the sub-diaphragmatic portion of the stomach. Where the hiatus is markedly enlarged, the whole stomach may lie in the left thorax, the duodenal caput presenting at the lower end of the shadow. Rotating the patient will alter the appearance of the hernia, and delineate its relation to the œsophagus, and by gradually raising the patient to a standing position the hernia will be greatly decreased or the whole stomach may become intra-abdominal again. Palpation of the abdomen over the stomach will fill the hernia and release of pressure empty it, demonstrating the continuity of the stomach supra- and sub-diaphragmatically. These observations point toward a hernia not complicated with adhesions or incarceration. While the examination is in progress, it is wise to note the position giving the least filling of the hernia, and the quickest emptying. These factors will play a rôle in the medical treatment of the case. Any constant deformity on the lesser curvature of the stomach should be studied to eliminate the possibility of a penetrating ulcer here. Erosion and ulceration are not uncommon at this site in the experience of other observers. We have had one case of ulceration in a hernia through the dome of the diaphragm.

Other pathological lesions and congenital abnormalities may easily be confused with this type of hernia. Diverticula at the lower end of the œsophagus are occasionally seen. When present they arise from the lower third of the œsophagus, and are usually placed to the right or left or posterior to the œsophagus, rarely arising from its anterior surface. In the erect position they will be noticed filling from the top, and contain gas, secretion, and barium until filled, when the barium shadow becomes pear- or oval-shaped, and empties from the top into the œsophagus. On inspiration the diaphragm will be seen below the shadow and the lower border of the diverticula will take on a greater curvature: the longitudinal diameter is increased at the same time. The barium will remain in the diverticula long after the stomach is empty. A hernia fills and empties with the stomach.

Diverticula arising from the cardiac end of the stomach, though infrequent, do occur. Six cases have been observed in our department during the last year. They arise on the posterior wall of the stomach above or below the cardiac orifice, and fill in the manner observed in diverticula involving the lower end of the œsophagus. They are best seen in the oblique position, and,

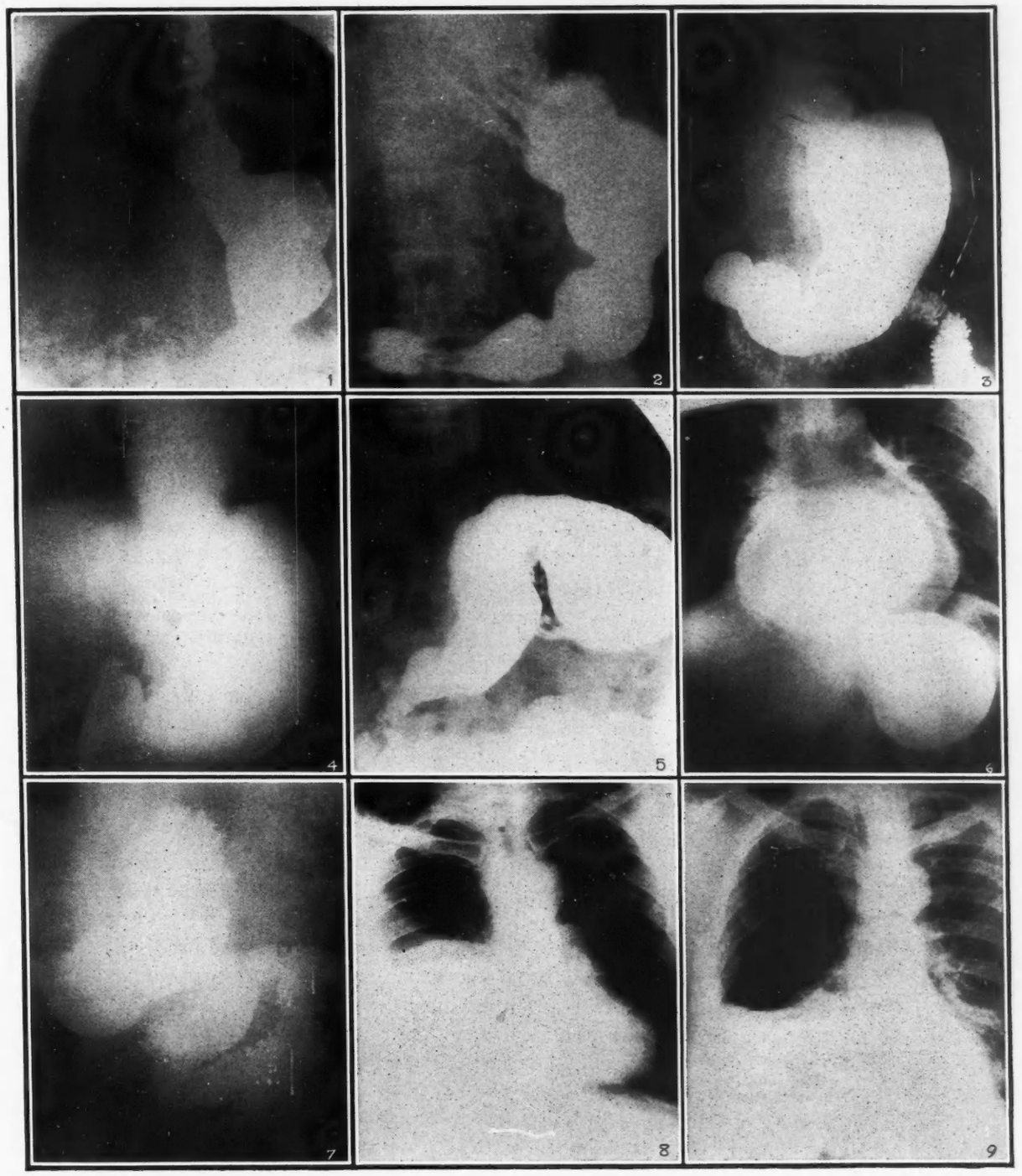

FIG. 1.—Case of congenital type, described in text as due to persistence of right and left pneumato-enteric recesses.
FIG. 2.—Same type as Fig. 1. Note the gastric rugæ above diaphragm.
FIG. 3.—True hernia, acquired type. Note constriction at site of opening in diaphragm.
FIG. 4.—Acquired type of larger size than previous illustration.
FIG. 5.—Acquired traumatic type. Note gas bubble in cardiac end of stomach above the diaphragm, also the deformity in the pars media of the stomach due to an adhesion dragging the pars media through the ruptured diaphragm. The ruptured diaphragm can be seen on the left.
FIG. 6.—Acquired type. Over 50 per cent of this stomach has passed through the hernial opening.
FIG. 7.—The same stomach as in Fig. 6 after operation by trans-thoracic route. Note the normal size and position.
FIG. 8.—Indirect traumatic hernia of the right diaphragm. Note the high diaphragm, fixed on respiration.
FIG. 9.—The same patient as in Fig. 8 after pneumoperitoneum was produced, and the patient was raised to the erect posture. Note the pneumothorax produced by air passing through the torn diaphragm.

like the œsophageal type, remain filled long after the stomach has emptied. Perforated gastric ulcer might possibly be confused with any of the above, but when we remember only 3 per cent of all gastric ulcers arise in the upper third of the stomach and we have never seen one above the cardiac orifice in 51,000 gastric examinations, it may practically be excluded as non-existent.

One special type of congenital hernia of the diaphragm demands mention here, Akerlund[10] places them first in his classification, and states they are infrequent. They possibly arise from congenital shortening of the œsophagus due to arrested development, but Akerlung advances the theory that persistence of the right and left pneumato-enteric recesses enters into its etiology. Should these recesses not only persist but enlarge and unite, there would be a projection upward of the embryonic peritoneal cavity around the lower end of the œsophagus, which is thus freed from the diaphragm and fails as a consequence to go down with it. Radiologically, this type is distinctly different from any other. In the erect position the œsophagus is normal to a point 3 to 4 inches above the diaphragm, a slight constriction is noted at this level—this is really the remains of the sub-diaphragmatic portion of the œsophagus. Just below this an oval dilatation is noted in the mid-line, and there a constriction showing gastric rugæ is seen where the stomach passes through the diaphragm. The sub-diaphragmatic portion of the stomach is smaller than normal and held close to the mid-line. Rotation in any direction fails to show the œsophagus below the first dilatation, rather the whole shadow is continuous, and no surgical procedure is possible for relief of this type.

Excluding the hernia through the hiatus œsophagi the most frequent variety seen is through the left diaphragm. Compared to the right side the ratio is as eight to two in the congenital and acquired group; in the traumatic type due to indirect injury, the ratio increases to 95 per cent on the left side. No figures may be given for the traumatic type due to direct injury. The congenital and acquired types herniate through the foramen of Bochdalek, the foramen of Morgagni, the dome of the diaphragm, and any embryonic fusion point. In the traumatic type of indirect injury the opening may be at any of these points, as in the acquired type the most common points are the foramen of Bochdalek, the dome of the diaphragm, and where the diaphragm is torn away posteriorly from its attachment to the thoracic wall. On account of the numerous sites of possible hernia, it is common to find not only the stomach but also small and large bowel forming part of the hernial content. We have also seen the spleen and left lobe of liver herniated through the diaphragm. While none of our cases had the left kidney displaced into the thorax, other investigators have reported its presence there.

This type of hernia gives rise to a class of symptoms so bizarre, that the actual pathologic lesion may never enter into the differential diagnosis clinically. Cardiac and respiratory symptoms are so common that an investigation of the chest is requested rather than of the intestinal tract. On the chest films however, evidence is found strongly suggestive of diaphragmatic hernia. The left diaphragm will be held high, fixed or limited in movement, and the herniated stomach or bowel will be observed filled with gas simulating a pneumothorax. Close observation will demonstrate gastric rugæ, valvulæ conniventes, or haustra markings in the gas shadow, and by this the presence of abdominal viscera will be recognized, or the appearance will be so suggestive as to call for a gastro-intestinal investigation.

When the barium meal is administered the stomach will be seen within the thoracic cavity, lying well to the left of the mid-line, the first portion of the duodenum and the upper part of the second will also be noted in the chest. When the patient is placed in the exaggerated Trendelenburg position the stomach falls upward in some cases to a point level with the apex of the lung. As the meal passes the small bowel will be noted in the hernia accompanying the stomach, but displaced posteriorly or external to it. When the patient is raised to the erect position reduction of the amount of abdominal content in non-incarcerated cases will be seen.

With the barium enema, in the supine horizontal examination, only a small portion of the transverse colon is present in the hernia, but on assuming the Trendelenburg position the transverse colon rapidly passes into the thorax. All positions from the latter to the erect should be used, as observations concerning the amount of auto-reduction or obstruction are valuable to the surgeon. The presence or absence of hydro-

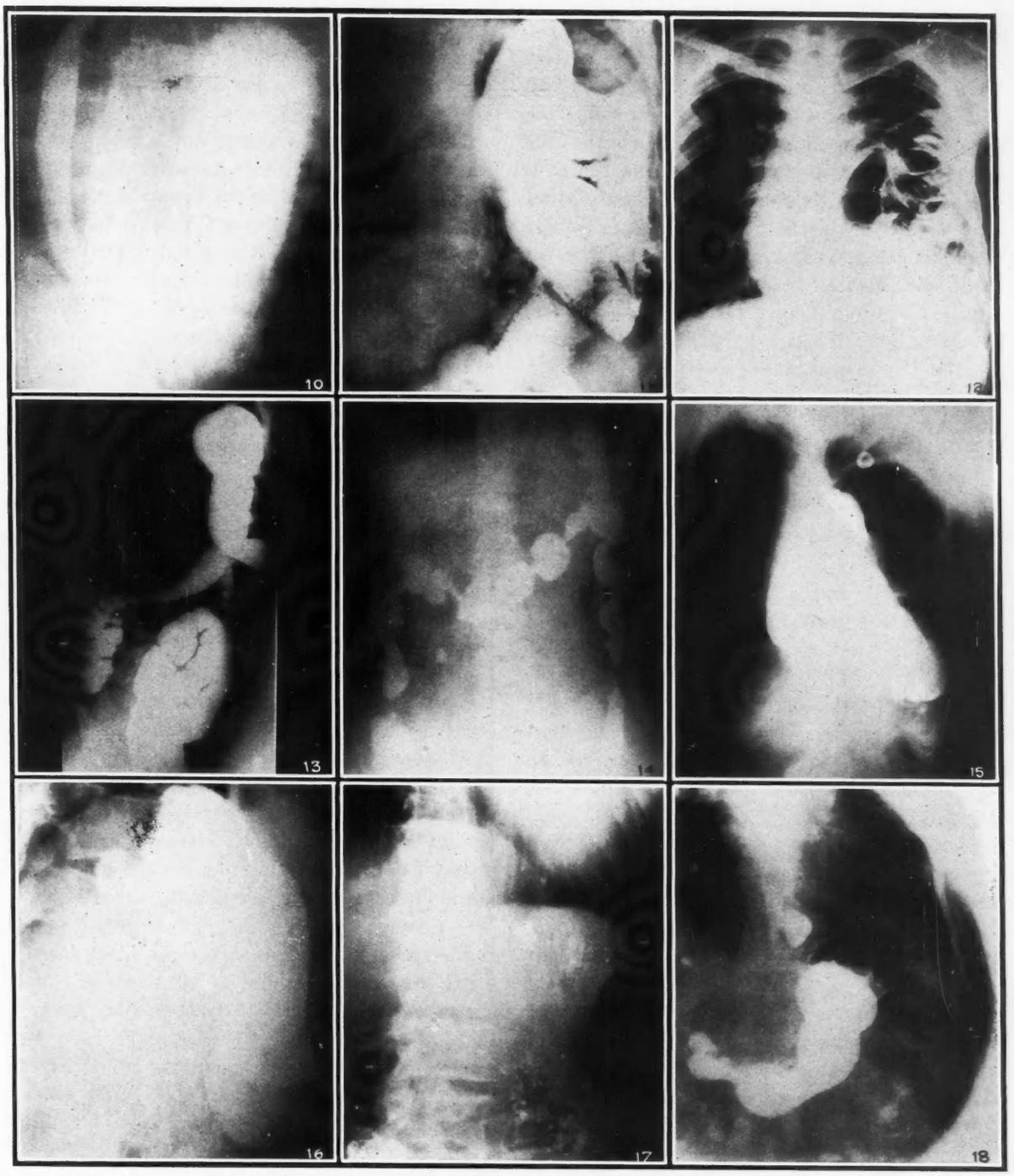

FIG. 10.—Hernia of stomach through dome of diaphragm, congenital type; ruptured gastric ulcer present with pyo-pneumo-thorax.
FIG. 11.—Traumatic hernia left side. Note stomach and small bowel in left chest.
FIG. 12.—Same case as Fig. 11. Note colon in left chest, with patient in erect position.
FIG. 13.—Same case with barium enema. Splenic flexure at level of third rib in Trendelenburg position.
FIG. 14.—Same case after operation. Note splenic flexure in normal position. Trans-thoracic route used.
FIG. 15.—Eventration of diaphragm. Stomach held very high, but the diaphragm may be seen without rupture above stomach.
FIG. 16.—Diverticulum arising from posterior wall of stomach.
FIG. 17.—The same case as in the previous figure, showing residue in the diverticulum, but the stomach empty.
FIG. 18.—Diverticulum at lower end of the œsophagus. Note diaphragm outlined by a gas bubble in fornix of stomach and the diverticulum above the gas bubble.

or pyo-pneumo-thorax should be ascertained; these when present indicate serious complications.

Eventration of the diaphragm on the left side is a common source of error in diagnosis. Eventration is due to an injury of the left phrenic nerve at birth or in later life. It is seen as a very high diaphragmatic arch, sometimes on a level with the second rib. During inspiration and expiration the movement of the diaphragm in this lesion is the reverse from normal, elevation on inspiration and depression on expiration. When a barium meal or enema is given the stomach and bowel will occupy a relatively high position, but the dome of the diaphragm will be seen to possess no lack of continuity and the abdominal contents at all times will lie below it. The reverse movements of respiration are also well demonstrated when the intestinal tract contains barium.

Hernia of the right diaphragm is rare in both the congenital and acquired types, and even more so in the traumatic type due to indirect injury. The sites of hernia on this side correspond to those of the left excepting the hiatus œsophagi and on account of the liver occupying all of the diaphragm's under surface this viscus is the most common content of the hernia. In this particular lesion thoracic symptoms are more prominent and a chest examination follows. Cholecystitis and cholelithiasis have also been diagnosed as the etiology of the patient's symptoms. When a chest examination is made by this method the diaphragm is found high, limited in movement, or fixed and slightly irregular. If this be the only investigation carried out such diagnoses as diaphragmatic pleurisy, cyst of liver, mediastinal tumour or eventration of the right diaphragm may result.

The radiological method of attack here is different from that used in other types. The liver acting as a pad does not allow the hollow viscera to enter the thorax. While the hepatic flexure will be found at a high level, we have noted great variations of its height are present in the normal colon and thus no information is gained from the enema alone. When this pathological lesion is suspected we carry out a pneumoperitoneum investigation. A trocar is passed through the abdominal wall, the cannula left *in situ*, and a tube attached; air or oxygen is then admitted to the abdominal cavity under screen observation until sufficient is present in the abdomen to outline by good contrast all the solid viscera. The patient is then raised slowly to a slightly recumbent or even upright position until such a time as the liver is seen to drop away from the diaphragm, leaving an area filled with air or gas. If an opening is present in the diaphragm the lack of continuity is noted and a pneumothorax is produced.

A defective embryological development of the hepatic flexure may be a source of error here; it has been termed hepato-diaphragmatic interposition of the colon. On examination of these cases by a barium enema the proximal portion of the transverse colon passes over the lower right border of the liver and loops up above the liver in direct contact with the diaphragm. The hepatic flexure and last portion of the ascending colon are also superimposed upon the superior surface of the liver, some stasis in the colon, and constriction from liver pressure will simulate a diaphragmatic hernia, but the diaphragm will be observed intact above the displaced colon, and no change in the position of the patient will cause it to pass into the thorax.

In hernias through the foramina of Morgagni the transverse colon is almost invariably the portion of bowel involved. The clinical symptoms here point toward a partial or complete obstruction. The barium enema is the method of choice for investigation. Observation should be made in the supine, semi-recumbent and Trendelenburg positions, noting the amount of bowel present in the hernia, the degree of obstruction, and whether the right or left foramen is the one involved. Stereoscopic films are advised for detailed study, as by these only may the side affected be demonstrated. May we urge that in any case giving clinical symptoms suggesting obstruction, the enema be administered before the meal. If a meal be the first administered a very real danger is present of making a partial obstruction a complete one, and endangering the patient's life by an emergency operation.

Lacher's statement, as given above, makes it imperative that examinations be carried out to demonstrate the presence of any solid viscera in the hernia. The use of thorium dioxide, as described by us in previous papers,[11] will demonstrate the migration of the liver or spleen from their normal position, and the use of uroselectan B or neoskiodan will demonstrate any abnormality of the kidney when the patient is placed

in all the postures from the erect to the exaggerated Trendelenburg.

When a radiologist speaks of treatment he does so in trepidation, and by treatment we refer to the application of any medical or surgical procedure designed to ameliorate or cure the pathological lesion present. Radiologists see the gastro-intestinal tract in a different manner from the clinician or surgeon. The clinician thinks of the stomach as he remembers it from the by-gone days of his anatomy teachings of Gray, Piersol or Cunningham; the surgeon as he actually sees the stomach at operation with the patient supine, under an anæsthetic, and visualizing only the serous coat: the radiologist views the stomach from the inside or the mucosal layer during normal function with the subject living and not under any anæsthetic. When all three of us reach a common meeting ground then and then only will some of the controversial points of to-day be settled. The line drawings are self-explanatory of this confusion.

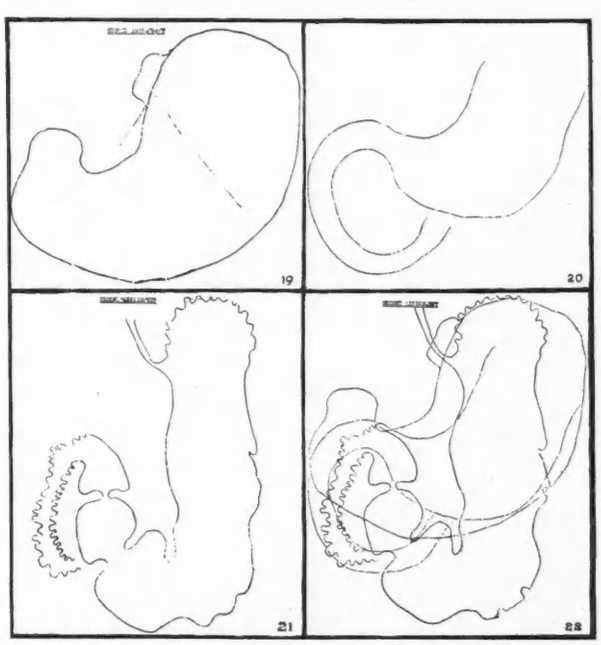

FIG. 19.—Outline drawing showing the anatomist's conception of the shape of the stomach (after Gray).

FIG. 20.—An outline drawing showing the surgeon's conception of the shape of the stomach when he draws a sketch to illustrate an operation. Line drawing from the original by Moynihan.

FIG. 21.—An outline drawing showing the roentgenologist's conception of the living functioning stomach.

FIG. 22.—An outline drawing showing the clinician's conception of the shape of the stomach from his recollection of bygone days of anatomy—modified by the surgeon's sketches and roentgenograms, or fluoroscopic examination.

The details of the various operative techniques do not lie in the radiologist's field and it would be presumptuous of us to take a description of them unto ourselves. For such we refer you to Hedblom[12] in the fifth volume of Lewis' Practice of Surgery; also Carrington,[13] Harrington,[14] and Gallie[15] in the recent literature.

SUMMARY

1. Diaphragmatic hernia occurs much more frequently than previously supposed.

2. Congenital and acquired hernias, due to faulty embryonic development of the diaphragm are the more common forms.

3. Symptoms are so varied and physical signs of such an indefinite character that clinical diagnosis is extremely difficult.

4. Radiological examination offers the greatest hope of a correct diagnosis.

5. Close co-operation between the physician or surgeon and the radiologist will give the highest percentage of cures.

The case of traumatic hernia of the right diaphragm was kindly referred by Dr. Trevor Owen with a definite diagnosis of right side hernia. The case of hernia of a traumatic type on the left side was kindly referred by Dr. R. M. Janes with a definite diagnosis. The case of hernia of the stomach through the œsophageal opening, Fig. 6, was referred by Dr. E. E. Cleaver and operated upon by the trans-thoracic route by Dr. Norman S. Shenstone with the successful result shown in Fig. 7. The case of hernia through the dome of the diaphragm with ruptured ulcer, Fig. 8, was kindly referred by Dr. Norman S. Shenstone. I am indebted to the "Cole Collaborators" for the four line drawings used.

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LATERAL CERVICAL ABERRANT THYROID*

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THIS brief paper, with an illustrative case, is presented in the hope of inciting a discussion upon the pathogenesis of aberrant or ectopic thyroid developing laterally in the neck and unassociated with the thyroglossal duct.

The theory that lateral cervical thyroid growths may originate in cells of the ultimobranchial body, which under normal conditions atrophies at the fifth week of fetal life, may be embryologically sound, but in some of the cases reported in the literature as lateral aberrant thyroid an associated malignant process of precisely similar structure has been demonstrated within the thyroid gland, which suggests the probability that the lateral deposits in such cases were metastatic and not primary. In illustration of this point I would cite the report of Cattell, of Boston, on 13 cases classified in the Lahey Clinic as cases of aberrant thyroid. Twelve of these were said to be cases of lateral cervical thyroid tumour. In 6 a portion of the thyroid lobe on the affected side was removed, and in 4 instances there was found in this material a malignant growth of the same type as that found in the lateral mass. Is it not possible that, if in all the cases reported in the literature as lateral aberrant thyroid a similar microscopical examination had been made of the thyroid lobe on the affected side, still other instances of lobar involvement would have been detected? And, where coincident disease of the lobe is met with, is it justifiable to assume that the malignant focus within the thyroid gland is secondary to the cervical deposit? Such an assumption, indeed, takes no heed of the direction of lymphatic flow and is contrary to one's experience of the trend of lymphatic invasion by tumour cells. My inclination in all such cases would be to look upon the lobar lesion as primary, upon the lateral cervical as metastatic. Nor is it essential here, any more than in the breast or prostate, that the primary tumour should progress *pari passu* with the metastasis. Because the lobar lesion is diminutive compared with the lateral cervical mass it should not be disregarded as a possible primary focus. After all, a lobar lesion is an evident fact. Why in such cases conjure up such a nebulous and remotely possible primary origin as the ultimo-branchial body?

In order to decide whether or not there exists a coincident lobar lesion, palpation, if negative, should be followed by exploration of the lobe.

In the Montreal General Hospital Clinic I have met with three cases which were diagnosed clinically as lateral aberrant thyroid. In two of these massive malignant disease became evident later in the homolateral lobe; and in the third—the case which I here report—a focus of malignant disease, precisely similar in structure to that in the lateral cervical mass, was found in the lobe on the affected side after its removal.

CASE REPORT

C.D., aged 15, a Canadian girl of Syrian parentage, was admitted on September 23, 1931, with the diagnosis of tuberculous cervical adenitis.

Personal history.—Negative.

Present illness.—A lump behind the angle of the mandible, on the right side of the neck, had been

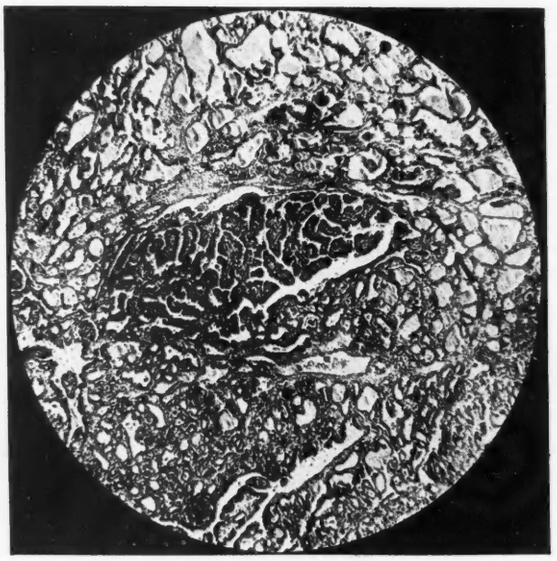

FIG. 1.—Section from the original tumour in the neck, showing well differentiated thyroid tissue and an area of papillary formation.

* Read before the meeting of the American Association for the Study of Goitre, Hamilton, June 15, 1932, and published in somewhat altered form in the *Western J. of Surg., Obst. & Gyn.* The illustrations are reproduced through the courtesy of this Journal.

present for two years, gradually increasing in size. There had been neither pain nor tenderness.

Examination.—Apart from the cervical condition physical examination was negative. At the median margin of the right sternomastoid muscle, behind the angle of the jaw, there could be felt a firm, insensitive mass, which was assumed to be an agglomeration of lymph nodes. The skin was not involved, but the mass was attached to the underlying tissues.

Operation.—Under general anæsthesia a curved transverse incision was made in the upper crease of the neck. On exposure the tumour was quite evidently malignant. The conspicuous features of the mass *in situ* were its fixity, its extreme vascularity, and its bluish-black colour. While its appearance at once suggested thyroid origin, palpation of the right lobe of the thyroid revealed nothing. Pending radiation only a small portion of the tumour was removed for microscopical examination. The sections showed a malignant papillary adenoma, which had developed presumably in aberrant thyroid tissue (Fig. 1).

After a course of deep x-ray therapy, which led to a very marked recession in the tumour, block dissection of the right side of the neck was performed. In addition to the remnant of the original tumour there were found numerous secondary nodes, extending from the mastoid process to the clavicle. These were demonstrated to be lymph nodes, though the lymph gland tissue in many of them was completely replaced by tumour. At the conclusion of the dissection the right lobe of the thyroid gland was removed. On its under surface, near the upper pole, there was found a hard nodule, the size of a split pea, quite sharply differentiated from the surrounding gland tissue by its comparatively pale colour. Situated as it was, it could not possibly have been detected by palpation. In this nodule and in each of the secondary nodes there was found, on microscopical examination, the same malignant structure as that found in the first tissue removed.

Sections from the thyroid lobe, including the area of the small nodule, showed the normal glandular arrangement giving way abruptly to an irregular structure, throughout which there were broad bands of fibrous tissue (Fig. 2). In the tumour area many of the acini were of moderate size, filled with colloid, and lined with a single layer of columnar cells. Others were small, devoid of colloid, and filled with solid masses of epithelial cells, which were very irregular in size and shape. In the larger cellular masses the interalveolar septæ could not be made out. A few mitotic figures were seen. In places large epithelial cells lay within the capillary channels. Here and there epithelial degeneration was shown by the basophilic staining of the cells. Immediately outside the area in which the broad bands of fibrous tissue were such a conspicuous feature the acini contained papilliferous buds. The whole lesion bore the earmarks of chronicity.

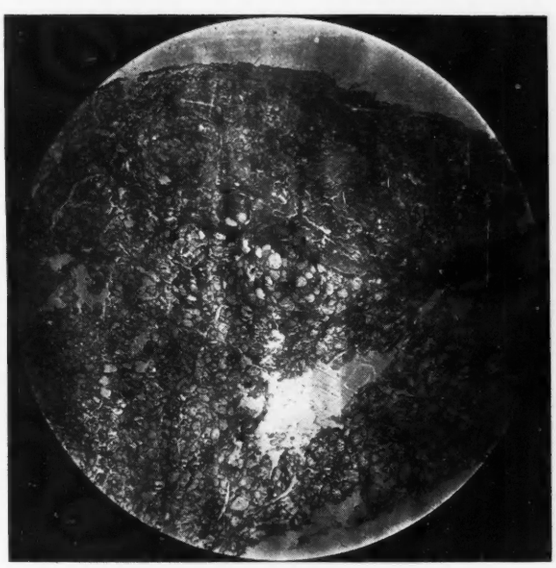

FIG. 2.—Section through the whole of the lobar tumour, which occupies the upper half of illustration.

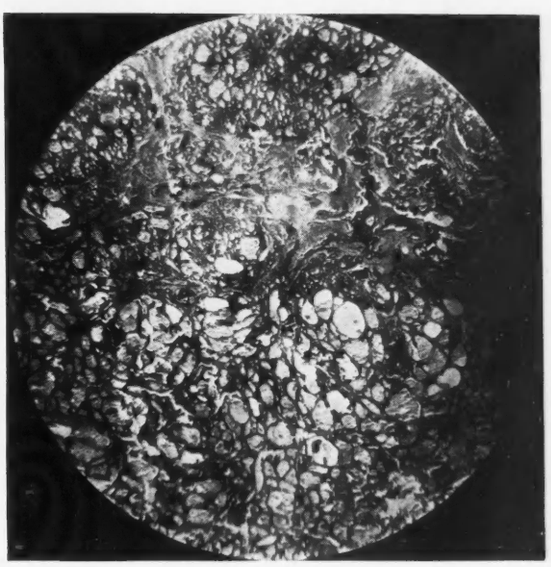

FIG. 3.—Showing margin of the malignant growth infiltrating the subjacent thyroid tissue.

I am indebted to Dr. L. J. Rhea, Pathologist to the Montreal General Hospital, for assistance in interpreting the histological features, and for the preparation of the microphotographs.

AMERICAN FISH USED IN MALARIA CAMPAIGN IN ITALY.—Malaria has been banished from the Italian province of Istria, at the head of the Adriatic, by the use of over a million American minnows in a campaign that has lasted for seven years. The method followed was reported to *Science Service* by Dr. Massimo Sella, director of the Italo-German Institute of Marine Biology at Rovigno d'Istria. When the work was started seven years ago, he says, the prospects were almost hopeless. In the region around Rovigno there were over eight hundred mosquito-breeding ponds, and 94 per cent of the population showed symptoms of malaria. Every year 200,000 of the American top-feeding minnow, the Gambusia, were dumped into some of the ponds, while the others were treated with Paris green. In 1927 there were still one hundred and forty-seven ponds harbouring mosquito larvæ; in 1931 only seven; in 1932 none whatever. For the past two years no one in the region has shown clinical symptoms of malaria.—*The Diplomate*, 1933, **5**: 162.

ANENCEPHALY IN IDENTICAL TWINS

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ANENCEPHALY occurs very rarely in twins. Occasionally case reports describe twins of which one is anencephalic, as in the case by Thompson.[1] Less frequently conjoint twin anencephalic monsters are described. Mudaliar[2] describes one such, a thoracopagus dibrachius dipus, an anencephalic female monster, fused from the root of the neck downwards, with separate heads. A careful search of the literature has, however, revealed no previous description of separate twins, both anencephalic. The twins described herewith were delivered by one of us (K.B.W.).

CASE REPORT

Family history.—The father is a laborer. The mother, now 31 years of age, is one of thirteen children. One of her brothers has a club-foot. She has been confined twelve times, with two sets of twins. She has never had a miscarriage or abortion. There are twelve living children. The first-born are twin boys, 15 years of age, who had a criminal record and were sentenced to Mimico Industrial School. Since then they have been transferred to the Ontario Hospital for Feeble Minded at Orillia. The next child is a girl who is unable to speak plainly, the next a boy who is also unable to articulate clearly. He is very small of stature, but quite strong and exceedingly pugnacious. He has been caught stealing various times. All the children exhibited an impediment in speech on reaching the talking age, and are backward in school. Since the anencephalic twins were born the mother has been delivered of one child in good physical condition.

The anencephalic twins were born (the ninth confinement), when the mother was twenty-nine years of age. So far as she knew they were full term, but she has menstruated so rarely in her married life that she has had difficulty in calculating the date of conception of her children. The physician was not called until she had been in labour one-half hour. A marked hydramnios was recognized, and she was conveyed to hospital. Twin presentations were diagnosed, one vertex, R.O.P. and one face, L.M.A. Forceps were applied in both cases, but failed to hold, and the twins were born spontaneously. There was only one placenta, the babies were both females, and probably identical twins.

EXTERNAL FEATURES OF THE TWINS

For convenience we shall designate the twins "A" and "B".

Twin "A".—The weight of twin "A" was 940 grm. This twin is typical of iniencephaly. Because of the extreme dorsiflexion of the head on the cervical and thoracic vertebræ, the nose is the highest point. The lower thoracic and lumbar vertebræ show marked kyphosis, thereby giving the whole spine a sort of S-shape.

There is an extreme spina bifida, extending the length of the cervical region and including most of the thoracic. Overlying this is a large and delicate fleshy mass, measuring 63 by 55 by 22 mm. which protrudes from a deficiency in the cranium which should be occupied by the occipital bone. Two membranes, the outer tough, the inner delicate, surround the herniated mass, and blend with the lining of the cranial cavity. Microscopic section of the mass shows it to be angiomatous, consisting for the main part of blood sinuses and vessels filled with clot, while an occasional degenerated neuroglia cell is found here and there.

The shoulders are carried high, and, there being no neck, the head rests entirely on them. There is a good growth of hair on the scalp and an abundance of subcutaneous fat, especially between the face and thorax, giving the fetus the appearance of having a double chin. In the "anencephalic syndrome", described by Browne,[3] characteristic features are gaping of the mouth, with protrusion of the tongue and bulging of the eyes. In this case however, while the mouth is gaping, there is no protrusion of the tongue, and while there is considerable thickening of the eyelids, there is no actual bulging of the eyes. The frontal bone, instead of rising perpendicularly, is rather flattened backwards in the vertical plane at an angle of about 15 degress to the orbital plate.

Twin "B".—Twin "B" weighed 875 grm. This twin is typical of the microcephalus acranius described by Nanagas.[4] There is no protruding hanging mass, which, together with the fact that it is less obese than "A", probably accounts for the difference in weight. What obesity there is is noted mainly in the upper thoracic and cervical regions. The head, instead of being dorsiflexed as in the case of the other

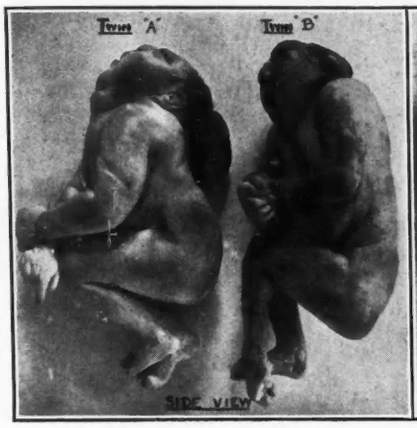

FIG. 1.—Side View.

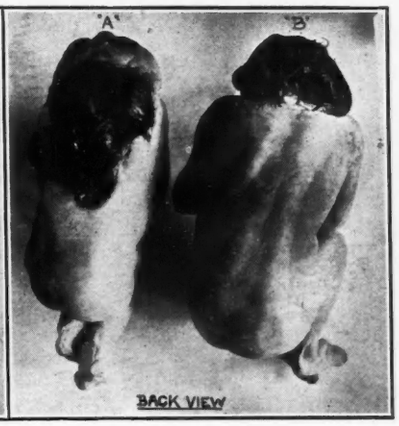

FIG. 2.—Back View.

twin, sits upright on the shoulders. There is no neck, but a deep groove running ventrally from ear to ear separates the head and thorax. The jaw sags and rests on the chest, but there is no protrusion of the tongue. The pinnæ of the ears are large and pendent, almost coming to rest on the shoulders. The eyes bulge and the nose is flattened. The shoulders are carried high, are slightly rounded, and covered with fine hair. The frontal bone, overlying which there is a considerable amount of subcutaneous fat, slopes backwards immediately above the orbits, giving the fetus the appearance of lacking a forehead. The top of the skull is completely deficient, the basis cranii being covered over by a thin, flattened, hard and fleshy mass, 47 by 54 mm., which in turn is covered over by membranes. The mass is surrounded by a deep groove anteriorly which becomes shallower laterally. There is no hair covering the mass, the growth of hair being confined to an area immediately outside the groove. Microscopically the mass resembles that of twin "A", *i.e.*, it mainly consists of blood sinuses and vessels. A small cyst showing some attempt at glandular formation was found embedded in the lower and posterior part of the mass. It weighed 35 mgrm. and measured 4 by 4 by 2.5 mm. The stubs of two cranial nerves were also found in the two small openings in the basis cranii under the mass.

A comparison of the skulls of the twins shows "A" to have a more complete skull than "B", although x-ray plates showed that the bones of the former were badly formed. The mass covering the basis cranii of "B" leaves no cranial vault at all, whereas the cranial vault of "A" is intact except for a deficiency in the occipital bone where the protruding mass issues. There is no spina bifida and the limbs show no malformations.

INTERNAL FEATURES AND ANOMALIES

Twin "A" shows a rare anomaly, in that there is a deficiency of the diaphragm on practically the whole of the left side, with only a thin span of muscle crossing from right to left on the anterior and lateral abdominal walls. This leaves a large opening through which the thoracic and abdominal cavities communicate. Through this opening the following abdominal structures protrude into the thoracic cavity:— (1) the whole left lobe of the liver; (2) the main part of the transverse colon and great omentum. The latter is frayed, ragged, and quite short, and does not come down as a fold over the intestines; (3) the spleen, located at the apex of left thoracic cavity and situated deep to the liver and transverse colon; (4) a large portion of the small bowel; (5) the stomach and first part of duodenum; (6) the pancreas. The normal thoracic viscera are pushed over towards the right half of the thorax. The heart is on the right and superior to it lies the thymus.

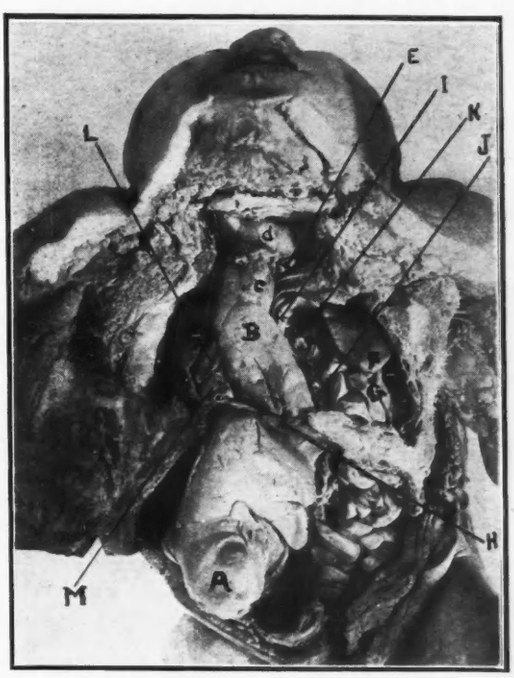

FIG. 3.—Dissection of twin "A" showing:— A. knob of liver herniating the umbilicus; B. left lobe of the liver; C. thymus; D. thyroid; E. accessory thyroid; F. spleen; G. small intestines; H. thin span of diaphragm; I. left lung; J. stomach and first part of the duodenum; K. transverse colon; L. right lung; M. heart.

The lungs are small and flattened, the left one being wedged in between the spleen, stomach, and left lobe of the liver on one side, and the heart and thymus on the other.

Ballantyne,[5] however, has shown that left-sided diaphragmatic defects are quite frequent in iniencephaly. Arey[6] says that "the persistence of a dorsal opening in the diaphragm, more commonly on the left side, finds its explanation in the imperfect development of the pleuro-peritoneal membrane."

Twin "A" also has an umbilical hernia containing a rounded knob of the right lobe of the liver, measuring 1.5 cm. in diameter.

Twin "B", on the other hand, shows very little deviation from the normal in regard to its gross internal anatomy, except for an exceptionally large left lobe of the liver, large, solid and congested-looking lungs, and a double right ureter. The thymus is made up of three lobes, but sections of it appear quite normal. Along the lower border of the thyroid gland there are four or five small bodies, the largest of which is about the size of an orange seed, and which on section proved to be an accessory thyroid. The others are small and were not examined microscopically.

The Adrenals.—Since the suprarenals and pituitary have been described by various authors as the endocrine glands showing the most change in anencephaly, a brief description of these glands will be given. The classical description of anencephaly always associates the condition with absence or poor development of the adrenal glands. Browne[3] says that they may be entirely absent on one or both sides. Vaclav[7] found the adrenals in 55 of 56 cases examined. Kiyono[8] found them present in 11 cases, whereas Ettinger and Miller[10] investigated 9 cases and in 2 they were entirely absent. When present, the chief disturbance lies in the cortex; the medulla is considered to be microscopically normal.

Landau[12] and Vaclav[7] describe the anencephalic adrenal cortex as being diminished in size, but precociously developed, in that there is a premature development of the permanent cortex, with a disappearance of the fetal boundary zone described by Elliott and Armour,[11] Landau[12] and Cooper.[13] Kiyono,[8] Ettinger and Miller,[9, 10] and others find the gland markedly underweight in all their cases. Bär and Jaffé[14] noted in 6 anencephalics of about the 7th to 8th fetal months, that lipoids were always present in large amounts.

In our case both suprarenals were found in each twin, always at the upper pole of the kidney. No accessory cortical nodules were found. The weight and measurements of each gland were as follows.

TWIN "A"

	Measurements	*Weight*
Left Adrenal	—19 by 8 by 5 mm.	0.355 grm.
Right Adrenal	—20 by 15 by 5 mm.	0.56 grm.

TWIN "B"

	Measurements	*Weight*
Left Adrenal	— 16 by 5 by 2 mm.	0.115 grm.
Right Adrenal	— 11 by 4 by 4 mm.	0.063 grm.

The normal weight of the adrenals at birth as given by Kiyono[8] is 2.5 to 3 grm. Microscopically, there were no essential differences in the arrangement or structure of the cells in the adrenals of the two twins, although lipoids were present in greater amounts in those of twin "A". There is precocity of development of the cortex in each twin, in that the definitive zona glomerulosa and zona fasciculata occupy about half of the total area of the shrunken cortex.

The pituitary gland.—In most of the cases examined only a pars anterior has been found. A few cases are reported in which the posterior lobe was noted. Browne[3] in his series of 5 cases found no trace of a pituitary body. Kohn[15] examined 11 cases, in which the anterior lobe was invariably present, the pars intermedia absent, and in only 3 was any pars nervosa discovered. Ettinger and Miller[9, 10] found an anterior lobe in 8 of their series of 9 cases and, of these, 3 only showed a pars nervosa.

In our case only the pars anterior was found in each twin. In twin "B" the cranial portion of the cranio-pharyngeal canal persisted. In twin "A" the measurements of the gland were 70 by 80 by 20 mm., and the weight was 80 mgrm. In twin "B" they were 89 by 80 by 30 mm., and 70 mgrm. Histologically, the gland was composed principally of blood sinuses or lacunæ. Between the blood sinuses columns of epithelial cells consisting chiefly of chromophobes and non-granular chromophyles, of which the former predominated, made up the glandular parenchyma.

CONCLUSION

A case of anencephaly in each of female twins, probably identical, is described. The occurrence of the condition in both babies, born

of a family with low mental development, supports the theory that the condition is an expression of inherited tendencies rather than an antenatal accident. In spite of the gross cranial defect common to both twins there are extreme differences in bodily development, leading one to believe that although the same basic cause might determine the anencephaly in both cases, the later physical development might be affected by environmental conditions, such as the intrauterine relationship, one to the other.

A survey of the literature reveals no previous example of anencephaly in identical twins.

We wish to acknowledge the assistance of Dr. W. D. Hay for his careful preparation of the photographs.

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ACUTE PHLEGMON OF THE STOMACH AND DUODENUM*

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PHLEGMONOUS inflammation of the stomach and duodenum is a pathological lesion of considerable rarity and is always deserving of report, more especially since the etiology still remains undiscovered.

According to Leith[1] the first description of phlegmonous gastritis was given by Varandaeus in 1620 in his "Tractatus de Morbis Ventriculi", while later mention is made of it by Borel, Bonet and Sand (1656-1701). These earlier references appear to have been concerned with the circumscribed variety of the disease, whereas the diffuse form was not definitely described until 1839 by Andral, and later, in 1861, by Cruveilhier. Greater interest in the condition in modern times has resulted in the recording of larger numbers of cases, so that Anderson[2] in 1922 was able to collect 220 cases from the literature. Four cases, also, were reported by Pritchard and McRoberts[3] in 1931.

The analogous affection of the bowel, phlegmonous enteritis, is of rarer occurrence still. Thus MacCallum,[4] in 1906, was only able to collect 7 cases from the literature, 5 only of which affected the small bowel. In an excellent summary of the literature Irwin and McDonald[5] quote in some detail 21 cases of involvement of the duodenum and jejunum, and refer to 3 further cases of Bohmansson's together with 2 personal cases, making a total of 26 cases in all. In a review of continental literature Bohmansson[6] analyses 68 cases but of these only 37 involved the duodenum and jejunum alone. The rarity of phlegmonous enteritis is thus evident.

The two cases referred to here occurred in the post-mortem service of Dr. K. H. Uttley, Medical Officer in Kowloon, to whom I am indebted for the opportunity of studying them.

CASE 1

The only information obtainable in this case was a history of abdominal pain, vomiting and diarrhœa for three days previous to death.

The body was that of a fairly well nourished Chinese male about 35 years old. The skin had a subicteric tint and showed post-mortem staining. Abdominal section showed the presence of general peritonitis, but there was no free pus in the cavity. Between the stomach and the duodenum there was a small amount of thick fibrino-purulent exudate. The general peritoneum, both parietal and visceral, had the dull, granular appearance characteristic of early peritonitis. The great omentum was partly drawn up into the epigastrium and its vessels were definitely injected. The duodenum and beginning of the jejunum were strikingly swollen and were obviously the seat of the main pathological process in the abdomen. The first part of the duodenum was a dusky shade, the second part only slightly so; the remainder of the duodenum and the first part of the jejunum were definitely congested and pink. The peritoneum in this area was much thickened, and the adjacent lymphatic glands

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enlarged and pink. The swelling, from the exterior of the bowel, appeared to be more or less bounded by the pylorus and to disappear fairly definitely with some abruptness at the beginning of the jejunum, about 42 cm. from the pylorus. The pink colour, marking the area of congestion, did not extend quite to the limit of the swelling, stopping about 8 cm. short of this point; nevertheless the vessels at the mesenteric border showed congestion all the way. Externally the stomach was not remarkable. The stomach was dilated and the walls quite thin; it contained a thin, darkish brown fluid with a few floating flakes. The pylorus was patent and the pyloric ring well defined. On the mucous membrane of the lesser curvature, about midway, were a few scattered areas of fine injection. For a distance of about 6 cm. along this curvature a slight but definite degree of swelling of the wall was noted with exaggeration of the rugæ. This thickening was well seen on holding the stomach up to the light, showing the limit of it to be quite definite and abrupt. The swelling did not extend around the whole circumference of the pylorus but was absent anteriorly and below, although the mucous membrane showed definite congestion. Over the rest of the gastric wall the rugæ were smooth and inconspicuous.

Passing along to the duodenum, the swelling appeared actually to diminish for about 2.5 cm., but then abruptly increased reaching a thickness of about 10 mm. The mucous membrane was bathed in muco-pus. The folds and the valvulæ conniventes were immensely thickened.

In cross section the bowel wall presented a striking picture, of which the most outstanding feature was the great thickening of the sub-mucosa. This coat was obviously responsible for almost the whole increase, and appeared as a greenish-yellow band separating the mucous and the peritoneal coats. It suggested a band of "solid" pus. The other coats appeared to be only comparatively slightly thickened. Beyond the point described the wall of the gut was normal. Nowhere in the mucosa of either stomach or duodenum were there gross hæmorrhages or areas of ulceration; in other words there was no solution of continuity of the protective epithelial covering.

The other abdominal and thoracic organs were healthy.

Microscopic picture.—Sections were made from typical portions of the duodenum, fixed in formalin, and stained with hæmatoxylin and eosin as well as with Gram's stain.

On low-power examination the swelling of the wall was seen to be due to the tremendous exudate within the sub-mucosa. The mucosa itself was only slightly swollen and the peritoneal coat also but little affected. Sections taken from a portion of the bowel adjacent to the affected area and thought to be normal were found to be very definitely infiltrated, showing that the process was not as circumscribed as appeared to be the case in the gross, but shaded off into the normal gradually rather than abruptly. High-power examination showed the mucous membrane to be œdematous, with some catarrhal desquamation of the epithelium; it is more than probable, however, that at least some of the latter was due to post-mortem change. There was definite proliferation of the interstitial tissue and a rather heavy infiltration with eosinophiles. This eosinophilia was strikingly limited by the muscularis mucosæ, and there were only a few of this type of cell in the deeper tissues. Conversely, the relative paucity of polymorphonuclear neutrophiles in the mucous coat offered a contrast to their dense infiltration in the sub-mucosa. Passing deeper to the sub-mucosa the exudate might almost be described as tightly packed. Where it was less profuse the interstitial tissue was widely dilated by œdema. Polymorphonuclears predominated here, but with a heavy admixture of histocytes, plasma cells and a few lymphocytes. The individual cells were well preserved at the level near the mucosa, but showed increasing signs of degeneration at levels deeper from the surface. The exudate in the muscular coat was striking, the individual muscular fibres being widely separated in many places.

The diagonally-running lymphatics piercing the muscle bundles were many of them clearly defined, owing to their being distended with cells of the exudate. There was much œdema with proliferation of interstitial tissue. The blood vessels were congested. The peritoneal coat showed thickening and œdema of the sub-endothelial connective-tissue layer and a thin outer covering of fibrin.

Sections stained by Gram's method showed infection with a Gram-positive diplococcus, somewhat pleomorphic, occurring discretely as a rule, but also in occasional short chains. Faint capsules could be demonstrated. The organism resembled the pneumococcus morphologically.

Those sections cut from the end of the gut distal to the most affected portion showed surprisingly few organisms, although the exudate was quite heavy; in fact, one such section only showed a few in one area. Other sections showed a fairly heavy infection almost entirely confined to the sub-mucosa, the mucous layer containing very few. The polymorphonuclear cells of the exudate were literally packed with phagocyted organisms. The histiocytes, on the other hand, only rarely contained organisms, but in their place were broken-down nuclei and debris of all kinds, including whole cells, their own nuclei being characteristically flattened in a crescentic fashion against the cell wall in order to accommodate their burden.

CASE 2

A Chinese male about 30 years of age was admitted to the Tung Wah Hospital in a practically moribund condition, without any history of previous illness, and died a few hours later. Autopsy was performed 20 hours after death. The body was well developed.

The heart, lungs, kidneys and pancreas showed no gross abnormality. The spleen was enlarged to about twice the normal size, weighing 470 gm. The liver was rather large and soft in consistency. The stomach was striking, owing to its great size. The duodenum in its first part was congested. General peritonitis was present, slight only in the lower abdomen, but well marked in the upper half of the cavity, a definite exudate of a flaky character being present, although not profuse. This was especially marked in the epigastric and right hypochondriac regions.

On opening the stomach practically the whole wall was seen to be enormously thickened, especially in the region of the pylorus, measuring from 15 to 20 mm. in thickness. An area on the dorsum near the cardia was however sharply demarcated from the rest of the stomach, being almost of normal thickness. The peritoneal surface in the pyloric region was very congested. The mucous membrane presented a remarkable appearance, being semi-transparent, gelatinous looking, and obviously swollen and œdematous. The normal folds were proportionately exaggerated. Near the pylorus were some areas of congestion and superficial hæmorrhage, and the pyloric opening itself was almost obliterated by swelling and œdema. No breach of the mucosa suggesting ulcer or perforation could be found.

Examined in cross section, the stomach wall showed distinct "banding", the thin mucous coat being distinctly demarcated from the striking, thick, yellowish-green, purulent looking sub-mucous coat, and this in turn, though not so sharply, from the muscular and peritoneal coats. The latter was rather well outlined by congested blood vessels.

Microscopic picture—Sections were fixed in formalin, embedded in paraffin, and stained with hæmatoxylin and eosin.

Under low-power examination the striking point was the immense thickening of the submucous layer. In those areas where the exudate was heaviest the impression of free pus was very strong, the microtome knife disrupting the cells from the widely stretched stroma containing them and making them appear free.

The muscular coat as a whole was thickened, and the muscle bundles widely separated by the exudate. The serous coat was much thickened also. Examination under the high-power showed the mucosa to be markedly œdematous and somewhat thickened. There was no loss of tissue or breach of the surface. The interstitial tissue was fairly well infiltrated, chiefly at the lower levels; near the surface this was very slight. There was some congestion. In places the mucous cells were catarrhal, being rounded up and desquamated. In the area near the pylorus, already referred to as showing a few superficial hæmorrhages on gross examination, the microscopic picture was confirmatory. At this point the process was obviously most advanced, the mucous coat being very heavily infiltrated and the blood vessels dilated and in many places ruptured, with resulting hæmorrhage. The cells lining the mucous glands were practically destroyed, but the stroma was definitely intact and there was no actual solution of continuity of the surface. Here too, in distinction to sections elsewhere, the exudate was of the same character as that seen in the sub-mucosa. In more moderately affected areas the exudate was confined to the deeper layers of the mucosa and polymorphonuclears were present in fair numbers; at intervals, too, small lymphatic vessels could be seen, packed with pus cells, really small potential abscesses. There was a great tendency in places towards multinucleation of the mucous cells, as many as eight nuclei at times being aggregated in one common mass of protoplasm. Many of the mucous cells had pyknotic nuclei; others were very faintly stained. Passing to the sub-mucosa the appearances were very variable; even in places showing marked swelling this was occasionally due to tremendous œdema with a relatively light scattering of exudate; mostly however the cellular exudate was dense, in places almost appearing as free pus but with little stroma to support it. The cells consisted of large numbers of polymorphonuclear neutrophiles and histocytes, with a variable number of mononuclear cells of the lymphocyte series and eosinophiles. The histocytes were strongly phagocytic for broken down nuclei and dead cells generally, while the polymorphonuclears appeared only to ingest organisms. Everywhere the endothelium of the capillary walls was œdematous and the cell nuclei swollen and projecting into the lumen. The blood vessels at the base of the mucosa were deeply congested. It was noticeable that the cells of the exudate were definitely more affected by toxic changes in the lower layers than in the layers approaching the mucosa.

The muscular coat showed marked changes also. There was dense infiltration between the actual muscle bundles, and fragmentation and necrosis of the fibres was widespread. Much hæmorrhage was to be seen in various parts of this layer.

The serosa varied somewhat in its reaction, but nowhere was it very heavily involved. In most places there was definite swelling of the endothelial cells and the sub-serous connective tissue was œdematous, proliferated, and with a fair to moderate or scanty infiltration with cells of the exudate. There did not appear to be any fibrin-formation. Gram-stained sections revealed the infecting organisms to be a streptococcus occurring singly or in short chains. The distribution of the organisms was most interesting. They were few or scattered only in the mucosa and in the deeper layers of the sub-mucosa. Passing from these two points in each case towards the middle of the sub-mucosa the concentration of the organisms became greater, arriving at a maximum at a level immediately beneath the muscularis mucosæ. Close observation showed them to follow the distribution of the perivascular lymph channels and small blood vessels which run parallel to the surface around the bowel. The sub-mucosa adjacent to the deep muscular coat and the muscular coat itself, as well as the serosa, were free of organisms.

Taking the whole picture under review it was obvious that the pathological process was more severe in the region of the pylorus than in any other area, and there is at least that much evidence for supposing that it had its inception at this point.

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THE 1932 THALLOTOXICOSIS OUTBREAK IN CALIFORNIA.—James C. Munch, Glen Olden, Pa.; Hyman M. Ginsburg and C. E. Nixon, Fresno, Calif., report an outbreak of thallium poisoning in at least thirty-one persons due to the consumption of grain containing 1 per cent of thallium sulphate ground and incorporated in tortillas. Symptoms developed in twenty within from one to three days; fourteen were hospitalized, and six died of primary thallotoxicosis within sixteen days. The others survived under treatment, one dying about two months later. These cases presented a well defined clinical picture of abdominal colic, nausea, vomiting and diarrhœa or constipation, stomatitis, alopecia, peripheral neuritis, and symptoms referable to cerebral involvements (ptosis, strabismus, convulsions, myoclonic or choreiform movements and optic atrophy). The absorption and action of thallium were rapid in these cases, as alopecia developed, even under treatment. From their present study, the authors recommend that treatment consist of: (1) emetics; (2) fixation by intravenous injections of sodium iodide; (3) gradual elimination by natural means or by the injection of small doses of sodium thiosulphate with careful attention to the urinary thallium excretion; (4) symptomatic treatment as indicated, and (5) rehabilitation by the administratoin of fluids, calcium salts, dextrose, orange juice, cod liver oil, and various nutritious foods. If pulmonary congestion is not present, pilocarpine may be administered to stimulate the endocrine system, and salivary and intestinal elimination. In case the administration of sodium thiosulphate causes a sudden exacerbation of thallium intoxication, iodides should be promptly administered and no further attempt should be made to use sodium thiosulphate for this purpose. The authors have further studies under way with a view to improving this procedure. The gross post-mortem examination of seven human beings dying after exposure to thallium showed alopecia, stomatitis, a yellow appearance of the liver showing cloudy swelling, œdema and hyperæmia of the lungs, and congestion of the leptomeninges. The microscopic examination showed fatty infiltration and central necrosis of the liver, diffuse nephritis, gastro-enteritis, degenerative changes and hæmorrhages in the medulla of the suprarenals, pulmonary œdema and widespread degenerative changes in the nerve cells and axons. Chemical analyses revealed the presence of detectable amounts of thallium in the kidneys, liver, lungs and spleen.—*J. Am. M. Ass.*, April 29, 1933.

PROPHYLACTIC ORAL VACCINE IN BACILLARY DYSENTERY

(A Preliminary Report)

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THE prophylactic oral administration of bacterial vaccines is by no means a new procedure, but since 1919, when Besredka, of the Pasteur Institute, published his papers dealing with the subject, much evidence of a conflicting nature has accumulated. The method has been given extensive trial in other countries, but has received scant recognition on this continent, and a search of Canadian and American literature reveals few references to it.

Besredka[1] stated that vaccination by the buccal route gave results distinctly better than those from the subcutaneous method, and cited several instances where the method had been used with extremely successful results. Newman[2], Costa, Boyer and Van Deinse,[3] Gauthier,[4] Nicolle and Conseil[5] and Munro,[6] among others, have reported favourable results with oral vaccination in human beings. Antonovsky[7] and Pascal[8] found this route successful in the prophylactic treatment of epidemic dysentery in mental institutions. Enlows,[9] on this continent, reported favourable experimental findings, but found the oral route not as successful as subcutaneous administration. On the other hand, Walker and Wats[10] and Wilkins[11] obtained unfavourable results in human beings and Zingher and Soletsky,[12] using rabbits, concluded that no immunity was produced against *B. paratyphosus B.* following oral administration of the organism.

Cathcart and Gordon,[13] in 1924, reported the epidemiological and clinical features of an outbreak of bacillary dysentery in a mental hospital. The disease had been endemic on one ward of the institution at least fifteen years, 37 cases being found between February, 1922, and August, 1923. The majority of the cases were of a chronic character, with numerous recurrent attacks, such as were described first by Mott,[14,15] and found to be due to two strains of *B. dysenteriæ*, both variants of the Flexner group. The mode of transmission was by direct contact. The disease showed a definite seasonal variation, being most prevalent during the winter months, when the patients, many of whom were of unclean habits and in a debilitated physical condition, were confined to the ward owing to inclement weather. The adverse environmental conditions were corrected as much as possible, and, in addition, it was decided to employ dysentery vaccine by mouth as a prophylactic measure.

The present study is a record of the results obtained by this method. The vaccine was prepared, using as antigens the Flexner strains of *B. dysenteriæ*, which were isolated from the patients on the ward. Large flasks of nutrient broth were heavily seeded with a 24 hours' growth from agar slants, and were incubated for four days at 37°C. Then the organisms were killed by heat, and the suspension of dead organisms in broth was used directly, no preservative being added. Preliminary experiments revealed that the preparation was non-toxic and that there were no demonstrable after-effects. The following method of administration was adopted and maintained throughout the investigation. There was no preliminary preparation of the patients, and the vaccine was given in place of the evening meal. Five doses were given in six days. The dose on the first day was 10 c.c.; on the next three days 20 c.c. each day. On the fifth day no vaccine was given, while on the sixth day the final dose was 40 c.c.

In October, 1923, this prophylactic therapy was administered to every patient on the ward and to each new admission coming on the ward until June, 1924. At this time all the patients resident on the ward were again given a complete course of treatment, and new patients up to

November, 1925, were given the vaccine on admission. During these periods, no cases of dysentery occurred. Between November 1, 1925, and February 8, 1926, there were 18 patients admitted to the ward, none of whom received the prophylactic vaccine, and immediately a new outbreak of dysentery occurred. Twelve definitely proved cases were found in which the etiological organism was isolated by stool culture, and, in addition, four other cases were clinically positive, although repeated stool examinations were negative for dysentery organisms. Of the 12 proved cases, 6 were found among the recent admissions who had received no vaccine prophylaxis. The remaining 6 had received vaccine two years previously. Four of these were uncleanly demented patients, and the other 2 were senile dementia patients, and both of these types had been found to be very susceptible to the disease. Four patients died during the outbreak, 2 of whom had received no vaccine treatment, the other 2 being the senile patients. The remainder made a good recovery.

On March 6, 1926, all the patients present on the ward, except those recovering from the disease, were given another course of vaccine, and all new patients were given vaccine prophylaxis on admission. This procedure was continued during the next 15 months, and during this period there was a total absence of dysentery in the ward. There were a number of patients who had diarrhœa, but there were no other clinical symptoms of dysentery, and stool examinations made regularly on any patient with diarrhœa, were consistently negative. In all but two cases the diarrhœa was of short duration, and was attributed to food disturbances or other minor factors. Both the other cases, who had shown a persistent diarrhœa without other clinical evidence of dysentery, eventually died and came to post-mortem. One of them showed a chronic catarrhal colitis with whipworm (*Trichuris trichiura*) infestation of cæcum and colon; the other, much to our surprise, showed no gross lesions in the gastrointestinal tract. In both cases cultures for dysentery organisms were negative at autopsy.

In 1927 no cases of dysentery occurred on the ward. During this year all new patients entering the ward received vaccine prophylaxis on admission. However, 14 patients entering between June and September, a three-month

TABLE I.

A condensed summary of procedure and results obtained, showing a definite decrease of cases following vaccine therapy. The cases of dysentery occurring in vaccinated persons were in those who had not received vaccine for at least one year.

Period	*Patients resident on ward; vaccinated*	*New admissions entering ward*		*Number of cases of dysentery*	
		Vaccinated	*Not vaccinated*	*Vaccinated*	*Not vaccinated*
Feb., 1922, to Oct., 1923.....	0	0	0	0	37
Oct., 1923, to June, 1924.....	75	47	0	0	0
June, 1924, to Nov., 1925.....	87	52	0	0	0
Nov., 1925, to Mar., 1926.....	0	0	18	6	6
Mar., 1926, to June, 1927.....	90	50	0	0	0
June, 1927, to Sept., 1927.....	0	0	14	0	0
Sept., 1927, to Dec., 1927.....	0	22	0	0	0
Jan., 1928, to Dec., 1928.....	0	30	3	0	3
Jan., 1929, to Mar., 1929.....	0	0	9	4	2
Mar., 1929, to Dec., 1929.....	84	32	0	0	0
Jan., 1930, to Dec., 1930.....	0	0	33	0	0
Jan., 1931, to Dec., 1931.....	0	0	34	0	0
Jan., 1932, to Sept., 1932.....	0	0	24	2	8
Oct., 1932.....	90	0	0	0	0

period in which the incidence of the disease had been found to be least, did not receive their prophylactic treatment till September. The fact that these patients did not contract the disease is important because it emphasizes the fact that the disease spreads mainly in the intervals when the patients are confined to the ward, with little opportunity for exercise and outdoor recreation in the grounds and parks of the institution.

During 1928 all new patients entering the ward were given as a routine a course of prophylactic vaccine on admission. Unfortunately, however, three persons, all recent admissions, contracted dysentery before vaccine had been administered. These three cases, occurring in unprotected patients, were all that were found on the ward during the year.

In 1929 six cases of dysentery occurred during January and February. On reviewing the previous history of these patients, it was found that 2 of them, through an oversight, had received no vaccine treatment; the other 4 had received prophylactic treatment, one four years previously, the others two years previously. Following this outbreak all the patients on the ward received another full course of prophylactic vaccine. No cases of dysentery were discovered during 1930 or 1931. In August, 1932, several clinical cases of dysentery occurred, but no laboratory confirmation was obtained. Regardless however of the lack of corroboration, all patients resident on the ward were given another full course of prophylactic vaccine treatment.

The above procedure, with the results obtained, is summarized in Table I.

In summarizing these results, it is seen that the only cases of dysentery occurring on the ward since oral vaccination was commenced have occurred either in unprotected persons or in patients who had been treated prophylactically at least two years before the onset of symptoms. With these facts in mind it is our intention to give oral vaccination yearly to all patients on the ward, commencing in the autumn just before they become more confined to the institution for the winter months.

AGGLUTININ RESPONSE TO ORAL VACCINE

The antibody response to bacterial antigens by mouth has been found by most observers to be comparable to that elicited by other routes of inoculation. Besredka, in animal experiments with *B. paratyphosus B.* (*Salmonella schotmulleri*), found agglutinins and other antibodies which rose rapidly and reached a maximum on the 25th day. Gauthier and Otten and Kirschner,[16] with *B. dysenteriæ*, demonstrated the presence of agglutinins following oral administration. Simons,[17] with *B. typhosus*, found antibodies in humans following administration of vaccine by mouth. Nicolle and Conseil[5] and Zingher and Soletsky,[10] on the other hand, were unable to demonstrate antibodies in the blood serum following the oral administration of bacterial vaccines.

A group of patients was selected and an agglutination test done on the blood serum. The antigen consisted of a killed suspension of dysentery bacilli, one of the same organisms used in the preparation of the prophylactic vaccine. The patients were selected at random, without reference to age or physical condition, and included some who had received previous vaccine prophylaxis and some recent admissions who had had no previous immunization. The test was done before and after the vaccine was administered. The macroscopic agglutination technique was used. The blood serum was not inactivated, and was used in dilutions of 1-20 to 1-5120. The tests were incubated at 37°C. for four hours, followed by overnight incubation in the icebox. They were read the following morning, and checked after standing at room temperature for another day.

The results obtained are summarized in Table II.

TABLE II.

Agglutination results on 46 patients before and after vaccine.

Titre of agglutinins	*Before vaccination*	*After vaccination*
Negative.....	9	0
1-40 or under.....	31	4
1-80 to 1-160.....	6	12
Over 1-160.....	0	30

These results indicate a well marked agglutinin response following ingestion of *B. dysenteriæ* by mouth. Before vaccination none of the patients showed serum agglutinins above 1:160 and the majority were under 1:40. The presence of agglutinins in these patients was due probably to previous infection or vaccine therapy. After vaccination all of the patients showed some agglutinins and 65 per cent of them were over 1:160.

DISCUSSION

It seems apparent from the evidence reported that the oral administration of dysentery vaccine has been successful as a prophylactic measure in controlling this outbreak of bacillary dysentery endemic in a mental hospital. If one contrasts the condition in 1923, when 37 cases were reported, with that existing at the present time, with no proved cases in the last two years, it is readily seen that some factor must be active in reducing the incidence of the disease. The fact that the disease promptly recurred after the cessation of the vaccine prophylaxis, and has been brought under control with its resumption indicates that the good results obtained have been due primarily to the vaccine.

The mode of administration is simple and causes little inconvenience to the patient, in contrast to the severe reactions which quite commonly follow subcutaneous inoculation. In several hundreds of administrations we have never encountered any untoward reactions, and feel that the method is entirely harmless, providing that the organism used does not produce toxin. The actual vaccine is very easily prepared.

The duration of the immunity produced appears to be somewhat variable but the fact that the disease has occurred in persons immunized two years previously indicates that it is certainly not lasting. We feel that the vaccine has given efficient protection for at least one year, and that those patients who are exposed to the infection should be given prophylactic treatment yearly.

SUMMARY

1. Bacillary dysentery, endemic on one ward of a mental hospital, has been successfully controlled by the oral administration of dysentery vaccine.

2. The preparation and administration of the vaccine is simple, and no reactions were encountered.

3. The immunity produced is not permanent, but is effective for at least one year.

4. The administration of dysentery vaccine by mouth is followed by the appearance of demonstrable agglutinins in the blood serum.

5. It appears probable that the method is worthy of wider application, and could be used successfully in other gastrointestinal infections.

Our appreciation is due to Drs. J. P. S. Cathcart and J. E. Gordon, who initiated this problem, and to Dr. F. W. Luney for assistance during the early stages of the work.

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UNILATERAL CHOKED DISK DUE TO CHRONIC TONSILLAR INFECTION.—George Wilson and W. F. Darkes report two cases of choked disk due to chronic tonsillar infection, and state that there are few bodily complaints that cause as much concern to the patient as disturbance of vision and the fear of blindness that frequently ensues when vision is affected. For a patient, therefore, suddenly to lose vision in one eye is an alarming state of affairs, and when optic neuritis or choked disk is discovered as the cause of that condition, the responsibility of the physician under whose care such a patient falls is great. The triad of symptoms headache, vomiting and choked disks is commonly seen in brain tumour. The choking of the risks in brain tumour is usually bilateral, and while an attack of sudden temporary blindness may and does occur, the loss of vision in brain tumour is usually gradual. Furthermore, there is a possibility for perfect vision to be had in a patient with a high degree of choking of the disks, if that choking is due to tumour. The characteristic features in the authors' cases and also in cases reported by others are sudden loss of vision, the rapid increase in the swelling and the unilateral involvement, although there have been reports of bilateral involvement. The removal of the tonsils, in both of their cases badly diseased, produced prompt improvement and a return in a relatively short time to a normal vision and normal state of the involved nerve. The authors conclude that no time should be lost in arriving at a diagnosis. Whether the choking of the disks is unilateral or bilateral, it is imperative to eliminate brain tumour as a probability. When that has been done, the possibility of chronic focal infection should be speedily investigated. If swelling of one or both optic nerves is the only physical sign present, and if the patient does not have headache or other symptoms suggestive of brain tumour, he should not be rushed into an encephalography, a ventriculography or a decompression operation. Cases of the kind reported have probably helped to increase the number of cases referred to so naively by the neurosurgeons as "pseudotumour."—*J. Am. M. Ass.*, April 22, 1933.

UNUSUAL ONSETS OF MULTIPLE SCLEROSIS, WITH SPECIAL REFERENCE TO EARLY PARÆSTHESIAS*

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SINCE Professor Guillain's remarkable report on multiple sclerosis at the International Neurological meeting of Paris, in 1924, many French neurologists of the younger generation have endeavoured to resume Guillain's researches in that field, and several original contributions have appeared during the past five or six years. The most recent and comprehensive work is probably that of A. Cournand. His thesis on acute multiple sclerosis is a good symposium of recent advances.

I shall confine my remarks to the unusual onsets of multiple sclerosis. It may also be inferred that the chronic, or common, form of the disease will be disregarded, because acute multiple sclerosis alone can offer an unusual beginning. For those who would question the exactness of the diagnosis, it may be stated that the acute aspects of the disease should be easily admitted if the following course of events corresponds to the classical descriptions, provided that death did not occur during the first days or weeks of its evolution. But, even so, cases with autopsy have revealed disease exactly similar to that of cases of long duration.

In order to avoid misunderstanding, let me state that by acute onsets of multiple sclerosis we mean essentially the rapidity of invasion and evolution, and the dissemination of lesions in organic neurological syndromes that do not correspond to clinical patterns, in cases where syphilis and neoplasms have been definitely eliminated.

It may seem somewhat surprising to hear of *acute* multiple sclerosis, when the disease is usually described as a chronic one. Text-books have taught this view, but one must not be blind to frequently observed facts. Professor Guillain, in his report, stressed the frequency of the rapid onset of the disease as compared with the slowly developing malady described by Charcot. We fully endorse his opinion. The unusual onsets to which we referred in our title are obviously not to be found in the chronic form of the disease. Its very definition implies an insidious, slow, and rather silent beginning. The acute aspects of disseminated sclerosis are apt to puzzle the observer. The symptoms are capricious and easily misinterpreted, and one will frequently be misled if he does not look at once for disseminated lesions, and for fine and unobtrusive indications of the disease, such as minute pyramidal, vestibular and cerebellar dysfunction. Even if apparently trivial, and apparently not fitting into the ensemble, the fact of the dissemination of infected foci is tremendously important.

CASE 1

A young boy, aged 14, while attending a religious service, suddenly felt bizarre sensations, described by him as pricks and numbness, over his left lower limb. Almost simultaneously the same limb was stricken with flaccid paralysis. He was hospitalized one week later, and, within 3 or 4 days following lumbar puncture, his right lower and upper limbs were the seat of identical phenomena. Spontaneous urination was impossible. This rapid invasion came on without any loss of consciousness, external trauma or recent infection. Superficial sensations were abolished over the left lower limb and greatly diminished over the right one. Both upper limbs responded well to sensation tests of all types.

Cerebellar tests were well executed with his normal left upper limb. There was a very slight bilateral horizontal nystagmus. There was a bilateral Babinski sign. The cremasteric and abdominal reflexes were absent on both sides.

Lumbar puncture did not show any sign of block. Total protein was: 0.40 grm. per litre; lymphocytes were markedly increased in number (60 per cubic mm.). The Wassermann, Pandy and colloidal reactions were all negative.

The patient left the hospital three months later, completely recovered as far as function was concerned.

With a superficial examination this case would have been quite mysterious and the exact diagnosis a mere guess. However, upon questioning the patient at length, he told us that one year before, he had felt unpleasant paræsthesias, which he described as numbness and tightness over the same limbs. Those sensations disappeared after two weeks and they were so well

* Remarks at a Clinical Session of the American College of Physicians, on February 9, 1933, Montreal.

forgotten that the boy stated at first that he had never been sick before. We cannot emphasize enough the great significance of such paræsthesias. They are very common and present in nearly 100 per cent of cases. Most of the time, however, patients do not mention them, and they have to be laid bare by careful and painstaking questioning. This case ended apparently well. Very likely the cure is a temporary one, and should be looked upon as a mere remission. Probably, he will be back at the hospital within a year.

In this case a careful search for the early manifestations enabled us to point to an exact classification. The apparent onset was a very unusual one, whereas the actual onset was very typical of such cases. It must be borne in mind that paræsthesias of all kinds may open the first act of the clinical drama. Fairly recently, Lhermitte reported a case, which proved to be a genuine multiple sclerosis, that started with electric-shock-like, shooting pains over the back and lower limbs. After the diagnoses of cord-compression and tabes were discarded, the author thought of multiple sclerosis, and the evolution of the disease pointed towards the exactness of his assumption.

CASE 2

Three months ago, we were called to a female patient, aged 32, who gave the clinical picture of a spastic paraplegia. During the past year, her lower limbs had become progressively weaker and frequently were the seat of unbearable needle-prick sensations. The examination revealed a typical pyramidal involvement, with very discrete vestibular manifestations. The lumbar puncture gave normal results to all tests.

We were right on the scent when she mentioned the unusual needle-prick sensations, and, although she confessed a fairly normal past, we unravelled a somewhat confused and short episode of paræsthesias and unsteadiness of gait ten years previously to the present illness. Undoubtedly, these apparently unimportant manifestations constituted the real onset.

We have briefly summarized this second case, firstly, because of the unusual long remission of ten years; secondly, because of the extremely important information conveyed by the confession of early paræsthesias, and thirdly, because of the atypical needle-prick sensations, fairly common, however, when carefully looked for.

CASE 3

A most interesting and rare onset has been observed in July, 1931, by my colleague Dr. Amyot, in a male patient, aged 20, whose symptomatology has been, from the very beginning, one of a pontile localization; hemiparesis with increased deep reflexes on the left side; right facial paresis of the peripheral type; limitation of eye movements in both lateral directions; nystagmus in both upward and lateral directions; symptoms of left cerebellar dysfunction over the left upper limb; left-sided numbness during the entire onset.

After having eliminated syphilis, intracranial tumour, and vascular disease, the diagnosis of disseminated sclerosis was finally arrived at because of the capriciousness of the syndrome and the presence of the initial paræsthesias.

CASE 4

Last November we were called to a nurse, aged 27, who had been complaining of a left facial neuralgia for the previous three weeks. There was no ear trouble, and no signs of herpes zoster could be elicited. Syphilis was eliminated immediately, while various x-ray examinations did not reveal any conclusive detail. Upon examination, we found a bilateral Babinski sign and a slight horizontal nystagmus in the left lateral direction. The neuralgia disappeared gradually, and so did the nystagmus, but the double Babinski was still present two weeks ago. If we add that one week previous to the onset of the neuralgia that the nurse had noticed sensations of numbness in both big toes, we will have completed the ensemble of positive signs that she showed.

It is most uncommon for multiple sclerosis to start with a facial neuralgia. This indeed was the first noticeable symptom, if we expect the uneventful paræsthesias of the big toes. However, proceeding by elimination as we did, and confronted with the obvious dissemination of otherwise scanty symptoms, we are very much tempted to classify our patient as a case of unusual subacute multiple sclerosis. She is still under observation, and we await further developments with keen interest.

In its apparent complexity this last case helps once more to establish the real diagnostic value of the early paræsthesias. Since we have looked for them systematically, we have always found them. We have no absolute pathogenetic interpretation to offer for their existence but we cannot but notice that paræsthesias are also a constant feature of neuritis, whether toxic or infectious. According to that assumption, the initial manifestations of multiple sclerosis would be peripheral in type, and the infection would reach the central nervous system by an ascending process in many ways similar to that in the so-called Landry's ascending paralyses. This is merely a tentative hypothesis, because multiple sclerosis may also be a primary systemic infection, with a marked tropism for peripheral nerves. At all events, the initial subjective sensory changes seem to indicate that the lower sensory neurone would be the first one to sustain the infectious insult. Routine sections of the sensory nerves of the limbs in patients dying with multiple sclerosis would probably clarify

the situation, and would likely afford a valuable basis for further productive anatomical researches.

If one closely analyses such cases as those reported above, there are classical symptoms that will almost constantly be present if they are carefully looked for. These are: a slight nystagmus, discrete pyramidal or cerebellar signs, polymorphous and changeable localizations, and a very capricious course of evolution. Other ways of reaching diagnostic evidence may be available, but the clinical picture is so typical that no experienced clinician should be misled. The real difficulty arises when such symptoms are absent, or so discrete as to baffle the observer. In such instances, however, the complete anamnesis should bring out evidence of early manifestations, such as the paræsthesias mentioned in our cases. Even if they did occur several years before, they should be given their full value, as has been already demonstrated. They ought to be considered as the most constant and earliest of all the symptoms of multiple sclerosis.

PUERPERAL SEPSIS*

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PUERPERAL sepsis is the general systemic and local reaction due to an infection of the genital tract and more commonly, the upper portion, following delivery. This reaction may be due to:— (1) products of the dead or living organisms; (2) changes in the maternal tissue due to the combination of injury, plus the organisms. Any of these products, with or without the organisms, may be taken into the blood stream.

It is a very unpleasant fact to all of us that there has been no appreciable lowering of the maternal mortality from puerperal sepsis for the last 50 years. This statement applies to the whole civilized world. In our country the death rate from the condition occupies too prominent a position, but we also know of many fallacies in the computation of statistics. Until we have some common international standard for inclusion of causes a comparison of the rates from various countries hardly seems justifiable. However the fact remains that maternal mortality is high, and this should be a great stimulus for *all* practising obstetrics to investigate further the prevention and treatment as well as to adhere rigidly to the present accepted knowledge.

ETIOLOGY

The uterine cavity with very few exceptions is sterile immediately after delivery and the infection comes from some portion of the lower genital tract and ascends to the endometrium. The causative organisms may be: (1) lying on or in the skin of the external genitalia, or the mucous membrane of the vagina or cervix; (2) introduced into the genital tract or carried further along at the time of delivery by the attendants; (3) introduced during the puerperium by the patient or nurses. In spite of the apparent evidence against infection being carried to the wounded areas by the blood stream, one must not lose sight of a possible metastatic origin of puerperal sepsis. Therefore, where possible, all sources of infection should be eliminated before labour. The lower genital tract offers many facilities for the growth of organisms when present. The external genitalia, with their numerous folds and crevices, are constantly moistened by the secretions of the vagina, urethra and rectum, and this provides a good media for bacterial growth.

There is a definite bacterial flora in the normal vagina, the presence of which is necessary for its health. Döderlein was probably the pioneer in the work of investigating the organisms in that part of the genital tract. He found that one organism predominated, a large Gram-

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positive bacillus, which was an ærobe as well as a facultative anærobe, and which coagulated milk and produced acid in the media. This was called the *B. Döderleini,* and later the vaginal bacillus. The other common organisms found are the *B. coli* group, staphylococci, saccharomyces, yeast, and various types of cocci. Often organisms are seen on direct smear but cannot be grown on media and consequently are not accurately identified. As the vagina approaches a pathological state, the numbers of *B. Döderleini* and their related organisms disappear and the various types of cocci increase. Under normal circumstances these cocci are non-pathogenic, but may become pathogenic in the presence of lesions of the genital tract, such as are produced by physical or chemical means or by the introduction of definitely pathological bacteria from without.

There is one family of organisms, namely, hæmolytic streptococci, which are the cause of the large majority of the deaths in puerperal sepsis. Our interest should centre particularly in this group. A review of the voluminous literature regarding the presence of streptococci in the genital tract during pregnancy, labour and the puerperium shows variable findings. One can, however, make the following deductions: (1) the presence of the *S. non-hæmolyticus* in the vagina during pregnancy and the puerperium is not uncommon, but this organism does not often produce puerperal sepsis; (2) the *S. hæmolyticus* is not often found in pregnancy, but more often during labour (from around the membranes and inside the cervix) and most often in the puerperium. Whenever found, however, it is to be looked upon as a virulent organism and a most probable source of infection. In a series of cases, covering a period of two years, we found the following.

1. *Ante-natal cultures.*—Five hundred and eleven patients had cervical cultures taken about two weeks before labour, during various months of the two years; only 7 were positive for *S. hæmolyticus.*

2. *Natal cultures.*—Out of 432 patients cultured during delivery, 14 were positive for *S. hæmolyticus.* Out of these 14 cases, the organism disappeared during the puerperium in 7, but remained to produce definite evidence of infection in the other 7.

3. *Post-partum cultures.*—Four hundred and thirty-five patients were examined and the *S. hæmolyticus* was found in 52 cases. Of these, 32 were cases of puerperal sepsis and the remaining 20 showed no evidence of infection. These organisms are found as commonly during pregnancy in primiparæ as in multiparæ and Williams, Fricke and many others feel that their appearance depends upon the personal cleanliness of the patients.

The *S. hæmolyticus* of puerperal sepsis belongs to the same family and is closely associated with those members which are accepted as the causative organisms in scarlet fever, erysipelas, septic sore throat, and certain wound infections. It is impossible to differentiate these organisms by ordinary cultural methods, agglutinating powers or by their structural characteristics. Definite cases of genital erysipelas are reported. One has occasionally seen a scarlet fever-like flush over the body in certain patients with puerperal sepsis. Sore throats due to *S. hæmolyticus* during labour and the puerperium are a most probable source of puerperal infection, whether the organisms are transferred from without or through the blood stream. It is found that those people who give a previous history of scarlet fever will have a very good prognosis if they should develop puerperal infection.

This organism appears to have an increased seasonal appearance and is found more frequently during the winter and early spring months. This appearance is coincident with the increased frequency of sore throats, middle ear infection and scarlet fever, and special precautions must be taken to protect pregnant and puerperal patients during this time. We found in our series of 867 cases that 75 per cent of the positive cultures in the puerperium and 71 per cent of the positive cultures during labour were found during the months of February, March, April and May.

At the present there is no specific strain of *S. hæmolyticus* which causes puerperal sepsis. Each strain produces its own agglutinins and toxins and there is nothing in common between them. Therefore it would appear to be impossible to develop a specific antitoxin against puerperal sepsis. We tried out a series of 100 cases with three varieties of puerperal *S. hæmolyticus* toxin by injecting normal patients intradermally as in the Dick Test; 22 to 33 per cent were susceptible to this toxin but there was no relationship between the results.

In one interesting case, after delivery, we obtained *S. hæmolyticus* from a sore throat with negative cervical cultures. Later, the cervical smears became positive and finally a positive culture was obtained from the blood stream. In each case, the toxins produced by these organisms, which were apparently arising from the same source, were different as shown by intradermal tests. In another patient, who showed a positive intradermal reaction with one toxin, we were able, by increasing doses of diluted toxin over a period of two months, to immunize her against that particular toxin, but she still remained positive to other toxins. Therefore, it would seem reasonable to conclude, as pointed out by Wadsworth, that in the presence of *S. hæmolyticus* it is a matter of individual resistance as to whether this organism will differentiate out with clinical signs of scarlet fever, erysipelas, etc. However, with puerperal sepsis we have the added factor of traumatism influencing the production of the infection.

PATHOLOGY

Accompanying the birth of the placenta, the lymphatic and blood sinuses are torn across, but are immediately closed by the contraction and retraction of the uterine muscle fibres. The blood coagulates and clots, and this extends along the capillaries and larger vessels of the uterine wall. The coagulating agent in the blood is liberated by the disintegration of platelets in the presence of calcium salts and extravascular tissue. The venous channels are obliterated and later become canalized and new vessels formed; lymph and serum are poured out into the interstitial tissue, and the reticuloendothelial cells, with the leucocytes, carry on their work as local scavengers. Within 24 to 48 hours after delivery, the interior of the uterus and particularly the placental site will show the presence of organisms on culture. These organisms are as a rule of low virulence and are easily kept under control and prevented from spreading by the phagocytic power of the cells, the fighting properties of the fluids, and by the mechanical obstruction of the clotted vessels.

In the presence of inflammation we have a concentration of biological and natural defensive barriers. From the products of the disintegration of tissue and organisms there is an increase of osmotic pressure, with a subsequent œdema which contains a large amount of fibrin. This œdema causes a thrombosis of the lymphatics and veins and thus mechanically attempts to fix the reaction to a local area and prevents solid particles (organisms) from being picked up in the blood stream. There soon appear large numbers of white corpuscles (polymorphonuclears) which carry on with the fixation process in their own manner. Finally special cells from the mesenchyme, lymph and blood spaces are activated and come to the aid of the polymorphonuclears and aggressively assume the rôle of phagocytes.

If the patient is a healthy person, this system of defence will look after most of the infections which are present post-partum in the genital tract, without systemic reaction. The hæmolytic strains of streptococci, with their virulent toxins, penetrate into tissue very quickly and multiply rapidly. The organisms may break down and liquefy the venous blood clot, but during this process the intima beyond this is eroded and thus a new blood clot is formed beyond the original one. This in turn, may be attacked by the organisms with their products, and this process often continues out into the large pelvic veins. Usually the defence remains ahead of the attack. In some cases, the organisms are directly precipitated into the blood stream, whilst in other cases the organisms with the counter-reaction, form small focal abscesses in the wall of the uterus. There is associated with this *thrombo-phlebitis* an inflammatory reaction in the wall of the vein (periphlebitis) and to some extent a local cellular tissue reaction. The uterus loses its power of contraction and retraction and remains large, soft and flabby. In a *parametritis* or *cellulitis* the main reaction is not in the veins (although there is usually an associated thrombo- and peri-phlebitis of the smaller vessels) but is a local or generalized lymphatic involvement. This cellulitis, if localized, affects frequently those ligaments which are said to have a common origin with the cervical fibres of the uterus. Every infected endometrium is a potential source of septicæmia, but a localization of the infection in any form favours a good prognosis. The spread of the infection to the ovaries and peritoneal cavity is practically always by way of the lymphatics. A general peritonitis is usually a terminal condition of the infection, and precipitated into that cavity from the blood stream.

CLINICAL COURSE

The clinical course of post-partum infection is usually influenced by several factors:— (1) the type of infecting organism-time and site of infection; (2) the pre-natal health of the patient; (3) the biological and natural defensive mechanism of the body; (4) the degree of resistance produced by certain serological constituents and cellular elements of the blood stream. In the presence of infection, these factors are dependent to a great extent on exhaustion, trauma and the amount of blood lost.

The onset of puerperal infection may be ushered in gradually, with an increase in temperature and a slowly rising pulse rate. On the other hand, patients with a slight rise of temperature may suddenly develop a rigor, followed by a profuse perspiration and a marked increase in temperature. In the series reported a year ago, the onset of the large majority of the infections occurred on the 3rd, 5th, 2nd and 4th days in order of sequence. The pulse rate is maintained above the temperature curve fairly well throughout the course of the disease. The lochia may be profuse and purulent at first, then becoming scanty and of a sero-sanguineous consistency. The red blood cells count remains fairly well fixed, early, but later (particularly if *S. hæmolyticus* is the causative organism) it drops decidedly. The colour-index is practically always below one. The white cells are varyingly increased, but do not rise to a high figure, except in those cases which proceed to abscess formation. The sedimentation time is low.

The patients are toxic, complain of interval attacks of pain in the lower abdomen, and often have diarrhœa. The lower abdomen is often distended and the uterus is larger than normal and tender. An abdomino-pelvic examination is better omitted, because of the risk of spreading infection, and, indeed, would give very little information if carried out early. Later, certain complications such as metritis, parametritis and thrombo-phlebitis may give characteristic findings.

There is no crisis with this infection, but the acute stages general begin to abate under treatment at the end of a week, and in the case of recovery the good progress is fairly rapid. Thrombo-phlebitis occurs usually in the second week, and often after an apparent regression in the course of the disease . It is associated with frequent rigors, high temperature, and a large, heavy, tender uterus, with tenderness in one or other iliac fossa. An abdomino-pelvic examination may show nothing in the affected fornix except tenderness, but in a few cases a definite thickening may be felt. Parametritis arises in continuity with the infection and is not associated with rigors or with sudden marked rises of temperature. As a rule parametritis goes on to fairly rapid resolution and clears up without many after effects. A few cases, however, break down to form parametric abscesses. General peritonitis, with its signs of rigidity, tenderness and distension, is a late stage in the course of the disease and generally presages a fatal termination.

TREATMENT

The general measures are well understood and include position, the pushing of fluids, and stimulation of uterine contraction. The surgical measures are practically limited to the drainage of abscesses. There are, however, reports of successful treatment in cases of thrombophlebitis by tying off the pelvic veins, or by removal of the pelvic organs. It is very difficult to know the safest time to carry out this procedure. There is grave danger of spreading an infection which might otherwise be localized and the mortality rate following such operations remains as high as, if not higher than, that following conservative treatment. Drainage of the peritoneal cavity seldom gives any beneficial results, except in the rare cases of primary peritonitis. It is also felt that any advantage which might be obtained with intrauterine applications or irrigations in most cases is heavily outweighed by the danger of spreading infection.

Non-specific measures.—The most important of these are blood transfusions, always given indirectly, which may be small in amount and frequently given (Polak), or larger and given less often. Good results are obtained from the immuno-type of transfusion (Wright), where streptococcus vaccine is given 3 to 4 hours before the blood is taken from the donor. Hofbauer has suggested indirect transfusion with pituitary extract, as the latter increases the production of the protective mechanism of the parametrium through the reticulo-endothelial cells. Innumerable drugs are used, each of which, according to the individual clinician, has

its own special value. Their multiplicity leads one to believe that no special drug is of outstanding value. Intra-muscular fixation-abscesses, by means of turpentine and calcium chloride have been used also as means of treatment. Vitamin "A", vaccines and protein injections of all kinds have been reported as having a definite value in the treatment of puerperal sepsis.

PROPHYLACTIC MEASURES

Prenatal care should include, where possible, the treatment of all focal infections. This should mean inflammatory conditions of the cervix and may necessitate cauterization of this area. Diseased cervices harbour organisms that are potential producers of puerperal infection. The immunization of pregnant women during the last month has been carried out with the use of vaccines and toxins. The results are not conclusive as yet.

Natal care.—There should be isolation and prophylactic measures of treatment of interference cases, or those running a temperature during labour. The maintenance of a rigid, aseptic technique in the labour-room must be observed, and the masks should cover the nose as well as the mouth.

The following have been mentioned in various papers, as producing a slightly increased risk of infection:— (1) ironing out the perineum—by grinding organisms into damaged mucous membrane; (2) rough massage of the uterus—with injury to the muscle fibres; (3) pushing the uterus too far down in pelvis. (This procedure is followed by a suction action on the return which carries fluid from the vagina to the uterus); (4) improper holding of the fundus after delivery, resulting in hæmorrhage—which is a close ally of infection; (5) too early use of anæsthetics which often leads to unnecessary operative deliveries.

A marked reduction in puerperal morbidity has been accomplished in the last few years by the use of further antiseptic solutions, such as mercurochrome and hexyl-resorcinol to the external genitalia and vaginal canal during labour and delivery. Goodall, Mayes, Baldwin and Ziegler report different methods of vaginal application, but their results appear to be uniformly good. These measures of technique have apparently proved their value and give to us an additional protection for the genital tract during delivery and the puerperium.

We have been using since 1926 large doses of scarlet fever antitoxin given intravenously and intramuscularly as a special measure in the treatment of puerperal sepsis. This serum was chosen because:— (1) its immunizing power against one of the family of hæmolytic streptococci could be measured; (2) it is produced in a definite way from a certain strain of hæmolytic streptococci (Dochez No. 5), and will neutralize a greater number of toxins from various strains of streptococci than any other toxin; (3) the clinical observation of a better prognosis in puerperal septic cases who give a previous history of scarlet fever.

It would appear that the stimulation of the various defensive powers of the blood stream, *i.e.*, the opsonic and phagocytic power of the white cells, and the bactericidal power of the serum is the most natural method of combating in a special way an infection of this kind. From the excellent results obtained with the use of scarlet fever antitoxin, we would strongly advise the continuance of this measure of treatment in both puerperal sepsis and septic incomplete abortion cases.

The essential point of the whole treatment in puerperal sepsis is that the measures used should be commenced as early as possible. In order to do this, we must have a systematic plan of investigation of every morbid case in the puerperium. The plan of investigation should include a careful clinical examination of every system, together with the use of all available laboratory information. A cervical smear should be taken for direct examination and culture.

Finally, as 75 to 90 per cent of the deaths in puerperal sepsis are due to *S. hæmolyticus* any acute or sub-acute case of puerperal infection should be looked upon as streptococcal in origin, until proven otherwise and treated accordingly.

CARDIAC ROENTGENOSCOPY*

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IN the "Oxford System of Medicine" Sir James Mackenzie[6] writes as follows: "The inspection and the palpation of the movements of the heart and the percussion of the heart's dullness give a far more valuable indication of the size of the different chambers of the heart than an x-ray examination." A review of the literature on the heart shows until quite recently a relative absence of consideration of x-ray evidence, and suggests that Sir James' opinion was also held by other prominent cardiologists. Cabot,[2] however, states in his textbook: "The longer I have tried to percuss the heart area, and the more I have watched others attempt to do so, correlating the results with post-mortem records and roentgen findings, the less I believe in the value of cardiac percussion."

Beginning with the pioneer studies of Vaquez and Bordet,[10] Groedel,[4] and Moritz, and ably continued by Van Zwaluwenburg,[9] Bardeen,[1] and more recently by Steel[8] and Rösler,[7] the x-ray examination of the heart has made steady progress to its present undeniable status as an essential supplement to the clinical examination of the cardiovascular system. This progress has taken place in spite of the usual handicap suffered by many of our recent laboratory aids to physical examination. Many clinicians unfamiliar with the limitation of the x-ray method of examination have expected too much of it, while on the other hand certain roentgenologists without clinical training may have exaggerated its importance. The recognition of the value of the roentgen-ray method of examination of the heart impresses one with the fact that sight is our most requisite physical sense for clinical examination, in that a visual impression is indelibly stamped upon our brain, whereas in other methods we are compelled to draw upon our imagination or store of former experiences in order to gain a proper perspective.

Crane[3] has reminded us that in the examination of the patient's cardiovascular system it is readily apparent that pain and mild dyspnœa can be realized only by the patient; the recognition of cyanosis and œdema depend on observation by the examiner, the pulse and precordial thrills are detected by touch, electrocardiographic and other tracings require special instruments, and the determination of the quality of the heart sounds involves the use of the stethoscope. The use of the x-ray is, however, our only means of determining accurately the form and size of the heart and aorta, the alterations in the size and pulsations of one or more chambers of the heart, and calcification in the aorta and pericardium. In addition it also offers confirmatory evidence regarding cardiac pulsations, the condition of the myocardium, the position of the heart and pericardial effusions. Its use as a supplementary method of examination therefore appears warranted.

The x-ray has provided two chief methods of study of the heart; roentgenoscopy and teleroentgenography, and although the latter is perhaps more popular on this continent for the study of cardiac size and contour the present discussion will be limited to the radioscopic examination.

On postero-anterior fluoroscopic examination of the chest, the heart stands out as a dense shadow in contrast to the marked radiability of the air-filled lungs. The size and shape of the heart are noted and vary with the type of individual. The tall slender individual usually has a long narrow or "drop-type" heart, with a convex left border. The short stout or "asthenic" type of person, on the other hand, generally has a horizontal type of heart with prominence on the left and a tendency to concavity of the left border. Another form is the so-called "globular" heart, frequently seen in children, which is centrally located, its borders reaching approximately equally far to the left and right. The atonic heart has a normal outline on inspiration, but on expiration becomes flattened out on the diaphragm, its long axis becoming

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more horizontal. This indicates a loss of tone of the heart muscles which are no longer able to resist elevation of the diaphragm. This is best demonstrated in the left anterior oblique position and may indicate an organic basis for the patient's symptoms. In those asthenic persons in whom the diaphragm cannot be lowered sufficiently to permit an accurate localization of the apex and lower border, the use of an effervescing mixture in the stomach, such as a Seidlitz powder, has proven to be a distinct aid.

The various components of the cardiac silhouette are usually distinguishable with little difficulty and appear diagrammatically as follows (Fig. 1): from above downwards, on the right side, superior vena cava, ascending aorta, right atrium and inferior vena cava (on deep inspiration); on the left side, aortic arch, descending aorta, pulmonary artery and conus, at times the left auricular appendage, and left ventricle.

Before proceeding with the subject of cardiac pulsations it must be apparent that the value of any fluoroscopic examination depends to a considerable degree upon the experience of the observer and his conception of what should be the normal findings for any given patient. In order that this disadvantage may be reduced to a minimum the making of tracings or orthodiagrams has proven invaluable. By immobilizing the patient and reducing the aperture of the roentgenoscope to small dimensions, the various outlines can be drawn upon a glass placed against the fluoroscopic screen. Later a tracing can be transferred to thin paper and kept as a permanent record. Where exact measurements are essential, in order to overcome any magnification it is necessary that the recording glass on the screen be made stationary in front of the patient and that a very small aperture emitting only the central ray be utilized. As the fluorescent spot is moved along the borders to be designated, a tracing is made on the plate with the other hand and offers a method of arriving at the correct measurements of the frontal aspect. The points are plotted in the expiratory phase of quiet respiration, in the diastolic phase of the heart cycle, and with the patient standing.

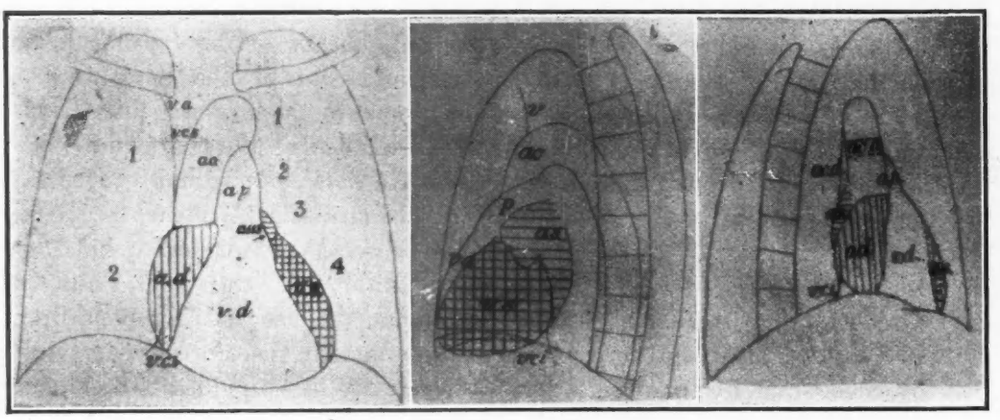

FIG. 1.—Frontal view. FIG. 2.—Left oblique view. FIG. 3.—Right oblique view.

DIAGRAMMATIC ANALYSIS OF THE CARDIAC SILHOUETTE

ad —right auricle
ao —aorta
ao.a—ascending aorta
ao.d—descending aorta
ap —pulmonary artery
as —left auricle
aus —left auricular appendage
p —pulmonary conus
v —vena cava
va —vena azygos
vci —inferior vena cava
vcs—superior vena cava
vd —right ventricle
vs —left ventricle

Orthodiagram apparatus such as is available provides a simple and comparatively ready method of producing a similar reproduction. Although reputed to be used extensively in Europe, its appreciation by cardiologists in this country, since the pioneer work of Van Zwaluwenburg, has been disappointingly slow. Probably because of its ready facility, radiologists generally find it expedient to use the seven-foot plate for the estimation of the cardiac size, although it cannot be denied that the orthodiagram frequently enables more exact determination of the cardiac borders in such

cases as many normal "drop-type" hearts, and also in displacements by pulmonary disease, where the heart border is superimposed over the spinal shadow. Exact measurement of the silent area on the left border is also permitted, as is the determination of the right auriculo-ventricular junction. Again, the position of the diaphragm, or occasionally cardiac pulsation, obscures or blurs the apex, in which case this could be readily recognized under the fluoroscope. The screen method of outlining the cardiac border permits of rotation of the patient in order to definitely locate obscure sectors, and also to choose the position and respiratory phase best suited for film reproduction. The estimation of the cardiac size from the orthodiagram may be made with the use of a planimeter, or by the measuring of diameters in the same manner as from the seven-foot plate and does not come under the scope of this treatise.

By rotating the patient before the screen all the borders of the heart may be examined and their various component parts usually recognized. In routine studies it has been found that turning the patient toward his left about 30 degrees with the central beam is most useful for the examination of the ascending aorta and atria; while rotation to the right of 40 to 50 degrees, as determined by the brightest clear space under the aortic arch, permits of an excellent view of the left ventricle, the arch and descending aorta. The posterior wrist should be grasped by the examiner over the screen, rotated medially and pulled forward. This draws the scapula forward and widens the intercostal spaces. Observation during deep inspiration is of course essential.

Diagrammatically, the silhouette in these planes may be analysed as follows: in the right anterior oblique position (Fig. 2), the posterior border is formed in the upper third by the ascending aorta, in the middle third by the left atrium, and in the lower third by the right atrium, the right leaf of the diaphragm usually crossing at the level of the right atrio-ventricular junction. The anterior border is formed from above downwards by the ascending aorta, pulmonary artery and conus, and left ventricle. In the left anterior oblique position (Fig. 3), from above downwards we have ascending aorta, pulmonary artery and left atrium superimposed on the left ventricle on the posterior border, while the anterior margin is formed by the superior vena cava, ascending aorta, pulmonary conus and right ventricle.

CARDIAC ENLARGEMENT

Although this is usually studied from the seven-foot plate or the orthodiagram, nevertheless the screen examination often proves a distinct aid. In cardiac enlargement the exact estimation of the size of the heart is of lesser importance, compared with the value of ascertaining which chambers participate in the enlargement. Fluoroscopic examination will in most cases prove sufficient to decide the question of the relative size of the chambers in enlarged hearts and in my opinion it is a more reliable method of recognizing heart disease than is the measurement of the orthodiagram or teleradiograph. In view of the wide variation of normal cardiac measurements it would appear that the chief practical information to be derived from a teleradiograph or from an orthodiagram of the heart is elicited by a mere inspection of the image rather than by its exact measurements.

Enlargement of the left ventricle may be doubtful in the frontal view, while in the left anterior oblique position one may observe definite bulging of the lower posterior outline, with encroachment on the retrocardiac clear space or even upon the shadow of the vertebral column. In the horizontal type of hearts the left ventricle should be regarded as enlarged only if these criteria are found on deep inspiration in all positions.

The location of the left atrium being chiefly posterior slight enlargement is recognized early by encroachment upon the retrocardiac space. This is well demonstrated by visualization of the œsophagus with a thick barium paste, when indentation and displacement are readily discernable. In excessive enlargement the left atrium may extend far enough to the right to form part of the right heart border in the frontal view. Its designation from the right atrium can, however, be easily made by inspection in the right anterior oblique position when the inferior position of the right atrium is demonstrated. Separate enlargement of the left atrium usually means mitral stenosis.

CARDIAC PULSATIONS

In the roentgenoscopic examinations of the heart one is first struck with the slight excursion to be seen anywhere on the cardiac border, and also with the considerable variation in the normal range of pulsation, conditioned by frequency of the pulse, the type of pulsation, and the form of the heart. The greatest excursion is observed in the convexity of the left border, corresponding to the lateral wall of the left ventricle. In asthenic individuals the lower end of the left border or apex moves most, while in the horizontal types of heart the greatest pulsation appears nearer the base of the left ventricle. The left oblique view demonstrates, perhaps, the greatest excursion of pulsation to be observed anywhere in the normal heart, that of the postero-lateral aspect of the left ventricle. The pulsation at the upper left cardiac border is comparatively slight, and is distinctly separated from that in the lower left border by a "silent" area of no movement, which corresponds to the atrio-ventricular septum. This point can usually be recognized. To the right of the sternum one can generally recognize the minimal movement of the right atrium. This resembles more a mass movement than an expansile pulsation, and is probably chiefly propagated from the right ventricle.

In the right oblique view we can usually recognize the expansile movements of the ascending aorta and the small excursions of the walls of the right and left atrium, although the separate pulsation of these chambers is recognized only occasionally in the normal heart in this view.

Although the apex is often considered to move the most, while the base is more or less fixed, yet the converse is probably more often true, unless it be in the so-called "drop-type" of heart. Ordinarily the base is the least fixed portion of the heart and moves towards the apex even more than the apex moves toward the base. As the ventricles contract the tendency is towards a shortening of the long diameter of the heart, but this is offset to a large degree by the simultaneous filling of the atria and the corresponding lateral movement of the upper right border. The lower border of the heart rests upon the diaphragm, so that the upper left border is the only sector which is free to move, and it does so in a transverse direction to the right and occasionally also slightly upwards. At the same time the base of the ventricles moves downwards towards the apex, so that the heart as a whole assumes a more globular outline. During the ventricular diastole the apex moves laterally and downwards to the left, causing an apparent elongation of the heart, although this is offset to a large extent by the simultaneous movement of the right and upper left borders toward the mid-line as a result of systole of the atria. The right ventricle, resting as it does on the diaphragm and on its anterior aspect against the sternum, does not permit of ready observation of its movements. The pulmonary artery shows only slight movement in the normal heart. In visceroptosis, where the heart lacks the support of the diaphragm and is suspended in the mediastinum from the great vessels and deep fascia of the neck, the base is relatively fixed and the whole heart moves as a result of the recoil from the expulsion of the blood into the aorta. In cardiac arrhythmias we frequently note that the movement of a certain segment of the cardiac border, for example, the left atrium in auricular fibrillation, appears unduly exaggerated and suggests the great probability of transmitted impulse from adjacent chambers. It would therefore appear that the electrocardiogram would offer much more in the study of disturbances of rhythm. Further, it would appear that in view of the probability that the character of the pulsations is dependent to a very considerable extent upon the size of the heart, and that a large heart does not necessarily indicate a poor functioning one, it necessarily follows that the roentgenoscopic appearance of the pulsations is not an accurate index of cardiac function. Certain disorders of rhythm do, however, permit of fluoroscopic recognition, and in the pathological heart one soon learns to recognize the disturbances of motion. The impulse may be excessive or insufficient; it may give the impression of being disorganized or fluttering, or lacking in purpose. Thus the experienced observer readily notes the heaving impulse of aortic regurgitation, the almost total lack of cardiac movement frequently seen in effusive pericarditis, and the shapeless flaccid outline with the rather wavy, toneless, poorly sustained impulses of myocarditis. The greatest excursion is seen in tachycardia and in dilated left ventricles, but also in increased heart volume con-

sequent uopn aortic insufficiency and in toxic goitre. Generally speaking, in mitral disease the greatest movement is observed near the apex, while in the aortic disease the greatest movement is near the base. The irritable type of pulsation is observed in toxic goitre, cardiac neuroses and paroxysmal tachycardia. Auricular fibrillation is easily recognized by observing the fluoroscopic image. Many times complete heart block can be diagnosed by observing the independent contraction of the auricles and ventricles, although slight delays in conduction time cannot be appreciated.

Fluoroscopic observation of the pulsating heart is also an aid in determining the chambers involved in many pathological variations of size and contour. In this connection one might mention the differentiation of the right atrium and right ventricle by noting the time of pulsation in relation to systole at the apex in those cases of right ventricular hypertrophy which produce marked widening of the right heart shadow. Again, in enlargement of the left atrium as seen in the right oblique projection, observance of pulsation frequently eliminates the consideration of mediastinal, pleural, or lung disease in the differential diagnosis. In the common type of congenital enlargement of the heart due to patent ductus Botalli, and also in almost all cases of right heart enlargement, the convexity of the left median curve, as seen in the teleroentgenogram, resembles the contour changes seen in advanced mitral stenosis, except that the prominence is usually at a slightly higher level in congenital and right heart disease. The differentiation can, however, be definitely made by the fluoroscope as a rule. In the congenital disease, the expansile rapid pulsation of the pulmonary artery, which causes the prominence, is readily observed, while no enlargement of the left atrium is demonstrable in the right oblique view. In mitral stenosis we seldom see the same expansile character of the pulsations in the prominent left border while, as pointed out by Hodges,[5] the so-called silent area becomes upwards of 1 centimetre in length and definitely below the level of the upper end of the shadow of the right atrium. Observation in the right oblique view demonstrates the dilated left atrium.

The diagnosis of effusion in the pericardium is greatly facilitated by the following radioscopic evidence: (1) no change in contour during respiratory movement; (2) absence of any pulsation at the widest borders of the heart shadow, where movement is normally the greatest; (3) change in contour with change in posture; this consists of a narrowing of the apex and a broadening of the base in the prone position, with the converse change in the erect position.

Adhesions to the sternum may be suggested by a lack of up and down movement with respiration as viewed in profile.

SUMMARY

The roentgenoscopic examination of the heart provides a ready method of ascertaining cardiac mobility and also permits through the orthodiagram or fluoroscopic tracing of an accurate record of cardiac size and movement. The experienced observer is permitted to study the force, tone, coordination, organization, and the presence of excessive or insufficient motion. He can also determine the intrinsic motion of the various chambers and the transmitted motion of the heart as a whole, together with its relationship to the other structures of the chest. Cardiac roentgenoscopy will never replace any of the present methods of clinical examination of the heart, but may be considered as a useful supplement to other recognized methods of study. Like the electrocardiograph it is essential only in diagnosing specific cases. Its future value will depend in a large measure upon the degree in which radiologists become interested in this fascinating field, inasmuch as the personal factor in the examination will always remain a considerable one, and the value of the examination is therefore dependent upon the experience of the observer. A combined method of auscultation and fluoroscopy might enhance its usefulness, while the development of a practical cinematographic method of recording cardiac movements and pulsations would provide a great impetus to this alluring method of study.

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A DISCUSSION ON HÆMOCHROMATOSIS, WITH THE REPORT OF A CASE

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THE patient, a male, aged 52 years, reported complaining of loss of appetite, dyspnœa, fatigue, and a heavy feeling in the stomach. Further close questioning revealed only one other symptom, that of diarrhœa. This had troubled him at intervals for the previous few weeks. Dyspnœa had been present definitely only fourteen days; a general feeling of malaise, a few months. There was a previous history of rheumatic fever as a young man.

The patient was of a short-plump type. There was an unusually grey look about the face, hardly an ordinary cyanosis. Breathing was noticeably fast, and his expression was stamped with irritability, fatigue and depression. The temperature, pulse and respiration were 97°, 84, and 24 respectively. The pulse showed total irregularity. The ankles and legs were very œdematous. Cardiac dullness was four and a half inches to the left of the mid-line, and there was a tricuspid regurgitant murmur. The lungs showed some dullness at the right base, with crepitations. The abdomen was much swollen, with a fluid thrill. The liver was palpable two inches below the costal margin; the border felt smooth and soft and the surface regular.

Blood examination showed: red corpuscles 4,200,000; white cells 3,600; hæmoglobin 90 per cent, blood pressure 120/90. The urine was negative for sugar, but a trace of albumin was present. The weight at this time was 158 lbs., but on admission to hospital, five days later, had increased to 163 lbs.

The Wassermann test was negative.

Films of the thorax and abdomen were taken. Dr. R. Procter's report was:— "pneumonic consolidation of the right base, with no evidence of carcinoma of the stomach." A provisional diagnosis of cardiac decompensation was made.

In hospital, the œdema responded rapidly and completely to digitalization; thus tending still further to confirm the cardiac origin of the trouble. It was felt however, in view of the rapid onset and increase in the œdema without cardiac pain, and the marked enlargement of the liver, that another factor might be present. Unfortunately, he was unable to maintain this improvement. Almost as soon as the massive doses of digitalis were withdrawn, and in spite of the continuation of maintenance doses, the œdema rapidly returned. A further course was tried a month later, and relieved the condition again, but to a lesser extent, and a third digitalization did nothing but produce nausea.

About this time, he began to get alarming attacks of syncope. These attacks would last a few minutes, without complete loss of consciousness, and were greatly dreaded by the patient. The œdema was still increasing, and the bases of both lungs showed signs of fluid. It was then decided to call in a consultant, and Dr. Hurlburt, of Edmonton, kindly consented to see the patient. His report was as follows:— "This case was seen in its final stages, and at this time showed marked enlargement of the heart, moisture in both lungs, enlarged smooth liver, ascites and swelling of the feet. My assumption at this time was that the liver condition was a chronic passive congestion, with acute failure superadded. I do not see that there was anything in the information at hand that could have led to any other conclusion."

On the consultant's advice, the patient was put on an Ebstein diet, calomel and saline purges, ammonium chloride and salyrgan. The patient responded well to this treatment for a while, but again later relapsed. Weakness and œdema became more and more marked. Cheyne-Stokes breathing appeared at intervals a week before death, which occurred 85 days after admission. The urine was repeatedly examined, but at no time was any sugar found.

Post-mortem examination.—There was blood-stained fluid in all the serous sacs. The lungs showed apical adhesions on right side, and solid œdema at both bases. The heart showed excess of fatty covering; the muscle was hypertrophied, and of a pale brownish colour; the valves were normal. The aorta was atheromatous. The liver was enlarged to the level of the umbilicus; its surface was brown and granular, but fairly even. On section, it was of firm consistency, dark brown, and of uniform appearance. The rest of the organs were normal. Unfortunately, the pancreas was not examined.

Microscopical report.—(by Dr. J. J. Ower, University of Alberta).

Heart.—Marked pigmentation, both of the muscle cells and phagocytes in interstitial tissue. Marked fibrosis with hæmorrhage and some fat infiltration. This fibrosis must have been a factor in the cardiac breakdown. The spleen showed no obvious abnormality.

In the liver there was marked cirrhosis with extensive areas of loss of liver tissue. There were extensive bands of fibrosis in which the bile ducts persist, with diffuse brownish pigmentation of liver cells, bile ducts and phagocytes. The gall bladder was normal.

The kidneys showed no obvious change bearing on the main condition. There were a few areas of granular atrophy.

COMMENT

Hæmochromatosis, or "bronzed diabetes," is a disease of considerable interest, both because of its rarity, and because of the interesting problems in pigment metabolism it presents. In the case described above, its association with heart failure may be of particular significance, or may be only an after-result of the rheumatic fever. Certain features are constant, and others, which indicate a spreading of the original process, may be present. The constant features are: a combination of cirrhosis with pigmentation of the liver cells. Combined with this there may or may not be either a similar combination or the occurrence of pigmentation alone in other organs. Both changes occur fairly frequently in the pancreas, the examination of which was unfortunately omitted in the case described above. When advanced enough, the changes so produced, interfere with its function, and diabetes ensues (50 per cent of cases).

In the case under review, cardiac failure was the prominent symptom. The microscope re-

vealed the typical combination; pigmentation was marked; and fibrosis extensive. It seems logical to assume that the causes and changes might also be due to the same processes as in other organs. The pigmentation is fairly constantly deposited in the skin, producing the typical bronzing. In our own case this was not obvious, although the marked œdema may have masked it; and after all, the acuteness of one's observation depends a good deal on knowing what to observe, and here the disease was not suspected. Deposit of pigment may occur in most tissues of the body. Hæmochromatosis is essentially a disease of very long duration, of insidious onset, not often suspected before death, because of its rarity. Less than 100 cases have been reported. The symptoms are of asthenia, with cirrhosis of the liver, sometimes combined with bronzing and with diabetes. The pigment deposited is of two varieties; hæmosiderin, which contains iron, and hæmofuscin, which does not give the reactions for iron. The origin of these two pigments cannot at present be definitely fixed, since one can only make conjectures about the actual composition of them both. Further the relation of the hæmoglobin of the blood to these pigments, to the pigment of brown atrophy, to the yellow brown material laid down as the body ages, has still to be worked out; as has the connection of the blood pigment with the urinary pigments and with *the iron normally in the cells in general.*[1]

While recognizing that a provable hypothesis is at present unobtainable, it is yet possible to see the sign-posts pointing in the general direction of the solution. Many theories have been suggested as possible solutions, and the following is a brief summary.

Since most of the iron contained in the body is contained in the hæmoglobin of the red cells, and these cells are being constantly renewed and discarded, it is natural to suggest that the fault lies here, in increased destruction and defective elimination of the iron of these cells. The only other disease in which hæmosiderin is laid down in any quantities is pernicious anæmia, and here we have an obviously abnormal hæmoglobin metabolism. The increase of pigment in this disease is, however, the only definite point of resemblance between the two diseases. Beyond a slight anæmia, there is no accompanying cirrhotic change, no change in the blood picture and no increase in bile production. Moreover, pernicious anæmia shows nothing comparable to the marked degeneration of body cells, occurring in hæmochromatosis. Lastly, the careful histological studies recorded by Rosenthal and Jaffé,[2] show a significant variation in the position of the deposit in the liver cells. In hæmochromatosis it is first the parenchymatous cells which accumulate the pigment, and the Kupffer cells contain none, until the hepatic cells are filled with enormous quantities. Pernicious anæmia shows an exactly opposite state of affairs. It is interesting to note here the effect of intravenously injected colloid iron. Iron thus injected has a great affinity for the Kupffer cells of the liver (Jaffé),[3] and further, the liver cells take up the iron only when large amounts are injected (Eppinger).[4] In this way it assimilates the liberated iron in pernicious anæmia and other hæmolytic anæmias. Destruction of old red blood-corpuscles and the formation of bile is now known not to be a function exclusively of the liver, but of the reticulo-endothelial system in general, of which the Kupffer cells are a part. This newer knowledge fits in well with the above observations of the position of the iron pigment in anæmias, and contrasts with its position in hæmochromatosis.

From these facts we may safely draw our first probable deduction, *i.e.*, that the iron found in this disease is not from an extraneous source; and since there are only two possible sources of iron in the body, the hæmoglobin and the body cells themselves, its source must be from these latter. The pigment may, then, arise intrinsically in the cells themselves. Further facts in support of this will be mentioned later.

Mallory[5] has suggested copper poisoning as a solution, since he found, accompanying the greatly increased iron content of the liver, a large increase in the copper content. He believed he had produced this condition in rabbits and monkeys by feeding them copper salts. It is difficult to see in the widely diverse cases reported and the absence of definite evidence of increase in copper consumption in any of them how this could be the main factor in the causation of this disease. Other investigators have been unable to produce hæmochromatosis by injecting or feeding large quantities of copper. Rosenthal[2] quotes the data lately accumulated that copper and iron are both necessary to the formation of hæmoglobin, and suggests that the

iron in the liver has a definite affinity for copper. He thus explains the increase in copper as being due to the corresponding increase in the iron.

Rosenthal[2] has also suggested, in a recent brilliant study of a case, complicated by carcinoma of the liver, that the cause lies in the inability of the liver cells to reduce ferric iron to ferrous iron, the only form in which iron may be utilized by the body. This inability is produced by a low grade chronic infection of the colon, which so injures the cell, that its power of reducing iron is impaired. It is assumed, reasonably, that the liver cells have as another of their functions the storage of iron. The iron, not being utilized, accumulates in the cells till they are saturated, ultimately producing death of the cells with liberation of the iron pigment. This pigment is then taken up by the resting histocytes of the periportal area and by the Kupffer cells last. The progressive degeneration of the hepatic parenchyma is associated with a replacement by fibrous tissue, and thus periportal cirrhosis.

The accumulation of pigment in other organs is further explained. With liberation of huge quantities of iron in the liver, the draining lymph glands join in its storage. In a somewhat similar manner this overflow is deposited in the pancreas, spleen, myocardium and other organs. The deposition of hæmofuscin in other organs, (skin, muscle of gall bladder, intestine, and heart) he explains in a different manner, as being due directly to the action of the same toxin from the colon on the cell itself, causing its degeneration.

It will be noted that this theory is a combination of three separate theories: (1) a deposition in the liver cells of their stored iron, due to their inability to utilize this substance; (2) the pigment in adjacent organs is carried there from this primary source; (3) degeneration of cells in other organs with deposition of hæmofuscin, due directly to the action of the toxin circulating in the blood.

Further light may be thrown on the problem by considering other conditions in which these two pigments are found, and their known properties. The most important and significant property of hæmosiderin is its insolubility. It is produced only by living cells in the presence of oxygen. In the light of Rosenthal's theory, we would assume that its insolubility is due to the presence of the insoluble ferric radical. In any case, if the body cell is unfortunate enough to produce this substance, it has an unpleasant mate from which it is powerless to divorce itself, or excrete; and which will, during long years, irritate and annoy its unfortunate partner, interfering with his normal tasks, slowly but surely reducing him from his former fat and healthy state, till he gradually sickens, fails, shrivels and so dies. Only with its final dissolution is it able to dissolve the fatal partnership, and allow its sinister mate out into a wider world, where it is finally caught and imprisoned in the lymph glands.

The only other disease where hæmosiderin is formed in any quantity is pernicious anæmia, where, as already mentioned, there is little doubt of its origin from the destruction of hæmoglobin which is expressed in the following equation.

$$\underset{\text{Hæmatin}}{C_{32}H_{32}N_4O_4Fe} + 2H_2O = \underset{\text{Bilirubin}}{2\,C_{16}H_{18}N_2O_3} + \underset{\text{as hæmosiderin)}}{\text{(Fe)}}$$

(probably combined

The lack of increase in bile production and other necessary evidence that the pigment in hæmochromatosis is from this source has already been pointed out; and the possibility of its origin from the body cell itself is now further explained. Rosenthal[2] assumes its very likely origin from the liver cells but not from other body cells. Brown states it is found during autolysis of the liver when air is present; and, more significant, that it may be formed from the iron-containing proteid of the cell, independent of hæmoglobin. Ischiada, also, suggests that iron-containing pigment may be formed in muscle from iron normally there, without requiring a hæmoglobin derivative. It is logical, then, in the light of the above facts, to deduce that we may have here not solely a pigmentary degeneration of the liver cells alone, but of any organ capable of this type of change; that is, that we have a general pigmentary degeneration of the body cells. This would simplify Rosenthal's explanation, since only one theory instead of three would satisfy the facts. It further simply explains the cirrhosis of other organs, such as the pancreas. It is fairly clear that this cannot be due to the irritation of the pigment present, since we have in pernicious anæmia a similar deposit without cirrhosis. If it is assumed that the pigment in the pancreas is carried there from the liver, how then can we also explain the cirrhosis? But assuming that the toxin acts in the same way, differing only

in degree, on the other organs, we would deduce the cirrhosis and deposit of pigment in the pancreas is also due directly to the action of the toxin. Similarly, coming to the second pigment, hæmofuscin, its deposit in skin and other organs is due directly to the degeneration caused by the toxin. Hæmosiderin, then, is a product of a degenerate cell. As the careful histological studies of Jaffé in Rosenthal's case show, the more degenerate the cell the more pigment it contains. The newly formed bile-ducts, and, in his case, complicated by a new growth, the new cells, were free from pigment. The pigment may be formed either from the degenerate red cell or the degenerate body cell containing iron, and is associated in the latter case with the other product of slow degeneration of body cells, namely, fibrous tissue. Once formed, the cell is apparently helpless to dispose of it, at least in sufficient quantities to prevent its accumulation.

Hæmofuscin presents many similarities to hæmosiderin, differing chiefly from the latter in that it contains no iron. It resembles it in being insoluble and a product of degeneration of the cell, and the cell has the same difficulty in disposing of it. It is found in association with its partner hæmosiderin, and alone, and is the cause of the bronzing noted in the skin. It is ascribed by some to an alteration of hæmoglobin which enters the cells in a dissolved form, but Rosenfeld after analysis found 3.70 per cent sulphur, from which he considers that it is related to the melanins. Like hæmosiderin, in this disease, its origin is therefore more likely to be intrinsic, a product of the cell itself, especially when one considers the absence in its composition of iron. The pigment of brown atrophy of the heart, also probably a melanin,[6] is considered by some to be identical with hæmofuscin. Both conditions are in the nature of a degeneration. The shrinkage of the cells containing the pigment in hæmochromatosis was noted by Jaffé, and would seem to correspond to the shrinkage of the muscle fibres in brown atrophy of the heart. Von Recklinghausen has termed this latter condition a local hæmochromatosis. Both pigments then could be formed by the same condition, and the formation of hæmofuscin thus fits in with our concept of the disease, and is probably due in the same way to the direct action of the toxin on the cell, acting over a long period, mild in nature, and producing atrophy, shrinkage and thus deposit of pigment. In pernicious anæmia the hæmosiderin comes from the destroyed red cells, and is deposited in the body cell from this source. The body cell is unable to dispose of it owing to its rapid formation, and the difficulty, on account of its insolubility, of elimination. The poison producing pernicious anæmia acts on the blood and its formative organs only, whereas the poison of hæmochromatosis acts directly on the cell, producing hæmosiderin as a degenerative product and its accompanying degenerative fibrosis. In pernicious anæmia the hæmosiderin is deposited in liver cells from an extraneous source, whereas in hæmochromatosis it is formed from the iron of the cell itself. Further, in the latter, as one would expect from the above conclusions, the body cells, noticeably of the liver pancreas, are affected more than they are in pernicious anæmia, since they are directly affected, and show atrophy, degeneration, and in some replacement by fibrous tissue.

The actual primary cause of the disease still remains obscure, since there are still fewer facts on which to build a hypothesis. Since it is the liver which is involved primarily and constantly, one would look on the food tract with suspicion as possibly producing some toxin. With the exception of the syphilitic, the causes of the other types of cirrhosis are still not definitely known. Rosenthal[2] suggests in this case a low-grade chronic infection of the colon which decreases the bactericidal and detoxifying powers of the intestinal mucosa, allowing various toxins and even bacteria to enter the portal circulation. On the other hand, this may quite as well be explained by the fact that this organ normally contains more iron than any other. Since it is clear that this type of degeneration results in a deposit of an iron-containing radical, the liver would necessarily show the greatest changes, no matter where the toxin originated. The toxin then would not necessarily originate from the alimentary canal, but from any systemic source. When one considers the complex structure of protoplasm, its constantly changing character during the processes of assimilation and dissimilation, the relation of the nucleus to these processes, and the alterations in the permeability that may occur in the cell wall, it is not surprising that the cell may default at times. In considering pigment metabolism its abnormalities and its relation to these pro-

cesses one very soon gets lost in a maze of fascinating speculation. The nature of the cell wall does seem to offer some help in the solution of these problems, particularly with the accumulation of hæmosiderin in pernicious anæmia. For example, the cell wall, composed chiefly of lecithin, allows simple organic compounds to pass through, but not the more complicated with large molecules; it is impermeable to most inorganic compounds. Its permeability varies according to the health of the cell and its surroundings. It is dissolved by bile salts. This latter action is well exemplified by the hæmolysis occurring, and must similarly cause a greater permeability of the body cell. As we have seen, iron is liberated in the destruction of hæmoglobin and probably reaches the cell not as hæmosiderin but as a simpler compound. The iron then is present in abnormal quantities in the serum bathing the cell, and in addition the cell wall is defective and will therefore allow the iron to seep through in such quantities that the cell is unable to maintain its normal balance, and the iron is precipitated as hæmosiderin. Possibly, too, something of the same action may occur in hæmochromatosis, but in this case the source of the iron would be the normal food iron supplied to the cell which seeps through the cell in larger quantities than normal and in the course of years accumulates, is metabolized by the cell to hæmosiderin, and precipitated. In this case, in both diseases, the hæmosiderin would be produced by the cell, but the iron in its composition comes from a different source.

SUMMARY

It is suggested that we have in hæmochromatosis an unknown toxic agent circulating in the body, comparatively mild in nature, acting over a long period and producing a general pigmentary degeneration of the body cells. In organs susceptible to cirrhosis there is generally an accompanying degenerative change. Like an old neglected bridge, whose iron piers, exposed for years to adverse weather, have weakened, wasted and rusted, so, the body cells, subjected to adverse factors, have weakened, shrivelled and become rusty, finding it increasingly difficult and finally impossible to support the normal span of life.

My thanks are due to Dr. C. W. Hurlburt for his help and comments in the case. In conclusion I would like to express my sincere appreciation for the help which is always afforded unstintingly by the Department of Pathology of the University of Alberta.

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ATYPICAL CLINICAL ASPECTS OF SYRINGOMYELIA: THE IMPORTANCE OF SYMPATHETIC TROUBLES

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IT is important to recognize the syringomyelic process at its very beginning, and this may extend over periods of months and even years. Therapeutic agents that can be opposed to its evolution are likely to be more efficient if they are applied at a period when destructive lesions have not yet appeared. The initial period is far from having always the same specific characters that are manifest during the more advanced stages of the disease.

The clinical picture of the disease in its advanced stages has been grossly outlined in textbooks, and is easy to remember. In typical cases one is able to come rapidly to an exact diagnosis. More often one is confronted with more difficult problems, difficulties which arise from the lack of classical symptoms, which are either not well marked, or are replaced by very unusual manifestations.

The initial cervico-thoracic localization of the syringomyelic process is the most frequent. However, it is far from being the only one; it often happens that the gliomatous cavitation starts either in the medulla or in the lumbar

cord. In many cases the symptoms are localized from the very beginning to one side, and remain on that side for a long time.

The muscular atrophy is often discrete and the wasting does not seem to progress.

Muscular fibrillations may be absent, even when there is muscular atrophy. They may be made evident after electrical or instrumental excitation of the muscles; they may also be exteriorized after special sensory stimulation at a distance, as has been described by André-Thomas under the name of "Phénomènes de répercussivité sensorio-motrice."

The first neurological manifestations of the disease are most frequently subjective sensory changes, such as pains and dysæsthesias. These changes however are gradually replaced by analgesia. Vaso-motor, sudorific, and trophic troubles are rarely absent. They should be regarded, according to our experience, as tremendously important, and should be considered as having the same clinical value as muscular atrophy and the sensory dissociation mentioned by Kahler and Schultze.

So far we have been dealing with well known phenomena. However, the diagnosis of syringomyelia is usually based upon the brachial localization of the troubles, upon the slowly progressive evolution, upon the radicular sensory dissociation and the peripheral motor changes. But it must be emphasized that the sympathetic troubles are part of the symptom-complex. Clinical cases, however, do not always present the picture that we expected, and it is chiefly during the initial period of a slowly infiltrating glioma that neurological signs are particularly puzzling and far removed from the classical description.

The following few personal cases will tend to demonstrate such difficulties. I have summarized them in order to obtain a more comprehensive and synthetic demonstration.

CASE 1

A male, aged forty-three, was admitted to the Notre-Dame Hospital in January, 1932. For the previous two months he had pains in the left shoulder, arm, fore-arm and hand, and numbness in the three last fingers of the same hand.

Examination.—The left hand was warmer than the right. The entire left upper limb was smaller and weaker. The left radial reflex was weaker than the right. There were fibrillations in the left deltoid and biceps muscles; syringomyelic dissociation of the sensations over the left upper limb and the upper left thorax.

The spinal fluid was normal to all tests; the blood serum negative.

Great diminution of the pains was noted after two x-ray treatments.

CASE 2

A male, aged 20, was admitted to the Notre-Dame Hospital in October, 1932. Four years before he showed thoracic kypho-scoliosis. No other symptoms or signs up to one year, when sympathetic troubles and weakening of the right upper and lower limbs appeared.

Examination.—The kypho-scoliosis was still present. There was a rotatory nystagmus contri-clockwise in the right and left gazes; right Bernard-Horner's syndrome. Absence of sweating over the entire right side of the body was noted, even after fifteen minutes' exposure to a heat-bath, when the entire left side was covered with profuse sweat. After the injection of one centigramme of pilocarpine, there was bilateral sweating, but the reaction was less marked on the right side. There was a normal and symmetrical reaction to the inhalation of one c.c. of amyl nitrite. Normal pilomotor reflex was noted on both sides.

Oscillations with the Pachon's oscillometer were more marked on the left limbs. They were, as normally, diminished after a cold local bath and increased after a hot local bath, but they were always more marked on the left side, which seems paradoxical. The right hand and foot were warmer.

Muscular atrophy was present over the right upper limb and the first interosseus muscle of the left hand; a few fibrillations.

Over the upper limbs, some reflexes were abolished and some were diminished.

Slight syringomyelic sensory dissociation was present over the right and left upper limbs, over the upper right thorax, and the ophthalmic portion of the right fifth nerve.

The Brown-Sequard syndrome was noted over the lower limbs, with pyramidal signs on the right.

The blood serum was negative.

Lumbar puncture showed a partial block.

The cerebrospinal fluid showed marked protein increase, with a normal lymphocytic count.

The lipiodol injected in the cisterna did not descend.

The lipiodol injected after lumbar puncture, the patient being head down, showed a partial stop at the sixth thoracic vertebra, where it travelled along two irregular pathways.

There was a slight improvement of the motor signs after intensive x-ray treatment over the cord.

CASE 3

A male, aged 29 was admitted to the Notre-Dame Hospital in July, 1931.

For the previous eleven months he had experienced the sensation of intolerable burning over the left upper limb, which increased when exposed to heat and after active movements; diminished when exposed to cold. When the hand was the seat of the painful spells it reddened.

Examination.—The left hand was warmer, redder and larger than the right. There was an incomplete left Bernard-Horner syndrome. Rotatory nystagmus was present in the direction clock-wise in the left gaze; horizontal in the right. Arterial oscillations were more marked over the left upper limb. Motor power and reflexes were decreased over the same limb. The reflexes were more active over the left lower limb. There was no Babinski sign.

Pain, heat and cold were more sharply felt on the left upper limb and over a large area of the left thorax.

The blood serum was negative; the spinal fluid normal.

Very likely we were dealing with a very discrete syringomyelic process, with almost nothing but vasomotor sympathetic symptoms similar to those in erythromelalgia.

X-ray treatment over the cord did not bring any results.

CASE 4

A female, aged 50, was observed in Paris, in the service of Doctor André-Thomas, June, 1928. She experienced sudden violent pain over the central portion of the external side of the right foot; later, diffusion of the pain over the entire foot and calf. This pain was compared to a burn and a twitching sensation. During the night, the pains were increased and the limb would be markedly warmer. When walking, the foot would swell and become warmer.

Examination.—Diffuse swelling of both foot and leg, which were redder than those of the left side, was present; the foot was colder.

Hyperesthesia of the foot and leg was noted when the skin is pinched. The reflexes were symmetrical; the pilo-motor reflex was more marked over the right lower limb. Dermography was less marked over the right lower limb and the right abdomen. Oscillations were less marked over the lower right limb.

There was syringomyelic dissociation of sensations over the right side up to the fifth thoracic. No Babinski sign; no sphincter troubles. The blood serum was negative.

X-ray treatment over the cord produced an improvement in the pain and the vaso-motor troubles.

CASE 5*

A female, aged 24, complained of pain over the right lower limb for the previous seven years, after a pregnancy.

Examination.—There was thoracic kyphosis. Muscular atrophy present in the right leg. Pressure on the right sole was very painful and there was a sensation of torsion, shooting, and coldness over the right lower limb. Cyanosis was present over the right ankle; the lower half of the right leg and the entire right foot were colder. Motor power was decreased over the same limb and fibrillations were present that were felt by the patient. The right calf smaller than the left.

A Babinski sign was present on the right side; right Achilles jerk was absent; the right abdominal reflexes were diminished. There was hypoæsthesia to pain and cold and heat over the entire right side of the body including the head.

Rotatory nystagmus; right corneal reflex sluggish. Urinary troubles present. The blood serum was negative; the spinal fluid normal to all tests. Galactorrhœa was present which had persisted for three years since a confinement. Later on, pain was noted over both upper limbs.

X-ray treatment over the cord improved all painful symptoms.

It would be interesting to comment on these observations at length. I will only try to classify certain facts that impress us more especially.

Firstly, it is always astonishing to witness how syringomyelic lesions spread, irritating and destroying the cord's components, with a capricious electivity, at least during the early stages, and consequently creating symptoms that are variable and dissociated. At times, the subjective sensory changes seem to be the only ones that appear with evidence; at other times, the muscular atrophy is gross and the subjective sensory phenomenas are absent. In still other cases, sympathetic manifestations are prevalent.

It should be noted that those sympathetic troubles are rarely complete, but most often present a dissociation. Indeed, in some cases the vaso-motor troubles alone are present, while in others sudorific or pilo-motor signs predominate. This dissociation demonstrates the fineness of the syringomyelic process, which is able to produce a splitting within the sympathetic functions whose medullary centres and tracks are so intimately grouped.

We stress again the view that sympathetic troubles should have the same diagnostic value as the symptoms provoked by lesions of the lower motor and sensory neurones.

The sympathetic syndrome, as we already said before, is very often represented by vaso-motor disturbances which may create painful symptoms comparable to causalgia or erythromelalgia.

Syringomyelia may give rise to pains of two kinds; namely dysæsthesias and genuine pains, such as twitchings, shooting sensations, and so on. Such sensory phenomena are caused by an irritation of the sensory fibres of the cord. It may also create pains of a burning type. In this instance they are the consequence, if not entirely at least for a great part, of peripheral circulatory changes induced by a vaso-motor mechanism, especially a vaso-dilator.

We feel that the vaso-motor dysfunction is responsible for certain trophic troubles of the disease. For instance, it may determine arthropathies and certain plantar and palmar retractions approaching those of Dupuytren's disease. (Bieganski, Testi, Oppenheim, Gualdi, Perrero, Monier-Vinard, Rouillard and Schwob, etc.).

One of our patients presented at the onset a thoracic kypho-scoliosis. The same onset has been reported in cases published by Alajouanine[1] and by Foix and Fatou.[2] The former emphasized the fact that a variety of juvenile kypho-scoliosis may be represented by an early, prolonged and isolated syringomyelic deviation. One must distinguish between the deviation resulting from muscular weakness and that occurring after vertebral arthritis (Cornil and Francfort[3]).

One of our patients showed a persistent galactorrhœa in addition to the early manifestations of the disease. André-Thomas[4] published a similar case previously to ours. Very recently, Roussy[5] with others reported an identical case. It is not officially accepted that the nervous system has a direct action on the secretion of milk. A different conception however may be

* Published by André-Thomas in *La Presse Medicale*, August, 1931, and observed in Paris, in the service of Doctor André-Thomas, April, 1929.

adopted in view of the evidence presented by these three observations. Certain lesions of the cord, involving its vegetative centres, as is the case in syringomyelia, may produce a persistent galactorrhœa.

Rotatory nystagmus, alone or associated with other bulbar symptoms, demonstrates that very often a cervical syringomyelia may extend to the medulla.

May we draw attention also to certain aspects of syringomyelias manifested by upper or lower limb signs which have a slow and insidious evolution and which are evidenced for a long period, by pains exclusively. Such aspects very often lead to errors, because we are dealing with a very definite localization of the pain, because the painful sensation is increased by active movements of the limb and by pressure over the aching area, because, lastly, of a certain adjacent swelling, as if we were dealing with an external lesion exclusive of the cord.

If after repeated and detailed neurological examinations, we find sensory, motor and sympathetic signs, we should accept most often the diagnosis of a medullary and syringomyelic lesion.

X-ray therapy, advised for syringomyelia by Lhermitte, partially improved four of our five patients. It seemed to have momentarily stopped the evolution of the disease. In all cases, we advise the x-ray treatment over the entire cord, whatever the extent of the apparent lesion.

Surgical procedures (Poussepp) may be tried where x-ray therapy does not succeed and when a portion of the cord shows a definite swelling simulating an intra-medullary tumour, as was observed in our case No. 2.

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Case Reports

A NEURINOMA OF THE VAULT OF THE PALATE

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The case described herewith seems to me to merit publication for two reasons, either of which would have been sufficient. The first is the rarity of the localization of a tumour which is common enough elsewhere. After a careful search of the literature I have been unable to find a single case of the kind reported. I venture to say that we have here a unique example of this localization of a neurinoma, unless, of course, instances have been reported which have escaped my notice. The second reason, which gives this case special importance, is that it has enabled Prof. Pierre Masson, of the University of Montreal, to clear up definitely the histological structure of the neurinoma, as very different from the structure of the fibroblastomas of the American authors, a matter which has constantly been disputed. A monograph on the subject, most fully detailed and enriched with drawing and excellent photomicrographs, was published by him in the *American Journal of Pathology* for July, 1932.

CASE REPORT

M.J.T., female, aged 15 years, came to the dispensary of the Notre-Dame Hospital, Montreal, on October 15, 1927, on account of the development of a tumour on the vault of the palate, which, on account of its rapid and steady growth, was beginning to cause her some discomfort. She had first noticed the growth about the end of August of that year, and it had probably started even earlier.

The personal and family history was unimportant.

History of the illness.—At the end of August, 1927, the patient noticed a small wart, of reddish colour, and very sensitive to touch. It did not bleed, and gradually increased in size until it reached that of a hazelnut.

Examination.—The patient had the appearance of general good health, but was slightly constipated. The urine presented a slight trace of albumin. The various systems were normal otherwise, save that there was slight facial asymmetry and the knee-jerks were a little

active. The temperature was normal and the Wassermann test was negative. The growth complained of was situated to the left of the middle line, opposite the first molar tooth. A tentative diagnosis was made of botryomycoma (?) and a biopsy was made, the patient returning to her home until the result should be known. The report was "Tumour of the palate—typical neurinoma." In view of the peculiar localization of the growth further material was requested, preferably removal of the whole mass.

The patient was thereupon referred to me for surgical intervention. My first care was to examine carefully the course of the peripheral nerves, in order to detect, if possible, other tumours of the same character. None were found. The tumour in question did not have a natural appearance, the removal of a portion of the tissue for biopsy having caused a general œdematous infiltration of the mass, while at the same time at the centre a crater was formed by the removal of the tissue. The middle line was quite unaltered, as well as the alveolar border, while the swelling extended from the first premolar to the second molar. The tumour had developed, apparently, on one of the branches of the superior palatine nerve, before its junction with the terminal portion of the sphenopalatine. It formed a mass sharply delimited, sessile, submucous, regular, smooth and glistening, measuring about 20 by 16 mm. It was situated somewhat nearer the middle line than it was to the dental arch, from which two bands of normal mucosa separated it, under which the underlying bone could be directly felt.

The growth was removed on October 26th. Anæsthesia was obtained by infiltration and blocking of the two small nerve trunks. An oval incision outlined the mass, which was removed without difficulty by simple curetting in about ten minutes. There was but little pain or hæmorrhage. The growth was sent to the laboratory for serial section.

The subsequent course of the case was featureless. When seen this year the patient presented a flat scar, almost invisible. She said, however, that occasionally she felt fleeting pains at that point. No other tumour was found elsewhere.

The particular interest of this case, according to Professor Masson, chief of the laboratory of pathological anatomy of the University of Montreal, lies in the fact that the œdema resulting from the first biopsy had dissociated the histological elements in such a way that their study was greatly facilitated. This permitted him to determine beyond question the microscopical anatomy of tumours of this kind as to which agreement was far from being reached. The American school (among them, Mulloy and Penfield) maintaining that these growths are of connective-tissue origin, while others (notably Verocay, Masson) consider that they spring from the covering of the nerves—the sheath of Schwann. The abundance of the collagenous fibres is, in the opinion of the latter school, an epiphenomenon common to all tumours arising from the nerve sheaths. In addition to the short report submitted, the following are some notes obligingly furnished by Professor Masson.

"October 28, 1927:— Tumour of the palate, a neurinoma partly modified by an inflammatory infiltration starting from the injury due to the previous biopsy.

"The tumour presents some characters that are so clean-cut that no doubt as to its nature can be entertained. Under low magnification two elements can be made out which are closely associated and in continuity. First, bundles formed of long protoplasmic spindles joining in every direction, demarcated by oval nuclei elongated and enclosed by delicate collagenous fibrils; secondly, areas in which neighbouring nuclei are arranged in linear series after the fashion of the staves of a cask. These rows of nuclei, more or less parallel to each other, are separated by a collagenous and fibrillar matrix. The combination of nuclear rows with collagen gives the nodules the appearance of a palisade. The two features described above are, both of them, characteristic of tumours derived from the proliferation of the syncytium of Schwann. Our tumour, therefore, ought to be designated by the name *neurinoma* (Verocay) or by its synonym *Schwannoma.*"

In conclusion, I would repeat that I have nowhere in my search come across any mention of tumours of this nature localized to the palate. The only review of tumours of the hard palate I have been able to find, outside of the textbooks, is one which appeared in 1914 in the homœopathic journal, the *Hahnemannian Monthly,* of Philadelphia. There is no mention elsewhere of the possibility.

A CASE OF GLYCOSURIA, SIMULATING CEREBRAL THROMBOSIS: POST-MORTEM DIAGNOSIS—BRAIN TUMOUR

BY P. M. MACDONNELL

Kingston

Mrs. K., aged 53, was seen by a doctor on the morning of December 31, 1932. Previous to this visit she had been diagnosed as having diabetes, but had not been under medical supervision for some time, and had adhered to no diet. He found her in a semi-stuporous state, and, in view of the history, feared diabetic coma and sent her at once to the hospital. She had been doing her housework up to the day before admission, but for a fortnight had been at times very drowsy, would sit down in a chair and go off to sleep very quickly; also it had been very difficult to get her to answer questions or speak at all, although she seemed to know she was being addressed. She had complained of some pain and tenderness behind and above the right ear. No paralysis or weakness of the arms or legs had been noticed.

Examination.—Showed a fat woman, very stuporous; her reaction to questioning was as above, only an occasional monosyllable could be elicited. Temperature 99.2°; pulse 90; respiration 20. Blood pressure 150/100. There was incontinence of urine and fæces. The patient moved very little, except her arms, and it was very difficult to move her in bed . The heart, lungs, and abdomen revealed nothing significant on examination. There was some tenderness over the right side of the head behind the ear. There was no odour of acetone on her breath. Blood sugar 0.26 per cent. Blood urea, 23 mgrm. Blood count was normal except for slight leucocytosis (16,000).

Three hundred c.c. of 10 per cent glucose-saline, containing 25 units of insulin, intravenously, produced no change in the mental or physical condition. A catheter sample of urine showed 1.2 per cent of sugar, but no acetone bodies.

Retinal examination showed no changes in the discs or fundi. Lumbar puncture showed clear fluid under normal pressure, with no increase in cells or globulin.

On January 1st weakness developed in left arm, going on to almost complete spastic paralysis. On January 2nd the left side of the face and leg were involved, and this likewise progressed to some extent. At the same time the patient became more stuporous, and helpless. The temperature and pulse began to go up; temperature 106.2°; pulse 160. Death occurred on January 4th.

With the above clinical picture a diagnosis of a slowly spreading cerebral thrombosis in the right hemisphere seemed logical. Later, more information was available which showed that she had been going downhill mentally for six months. There was neither headache, vomiting, optic neuritis, giddiness, convulsions, or any loss or disturbance of vision. For this reason and in view of the post-mortem findings the case seemed worth reporting.

Autopsy.—This was partial, limited to the head and abdomen—Prof. James Miller. January 4, 1933.

The body was that of an oldish woman, very short, with prominent abdomen and large breasts. Rigidity was present. There was no lividity of the dependent parts.

Brain: some adhesions were present over the vertex, also slight adhesions between the frontal lobes and dura. A considerable quantity of clear fluid was present in the subarachnoid space. The convolutions had a flattened pale appearance. The brain weighed 1150 grm., and on placing it on the table the right frontal lobe sagged and on palpation was found to be soft and cystic. Nothing was found in any part of the brain except in the right frontal lobe which was the seat of a soft almost gelatinous, in parts translucent, growth, with cystic degeneration and a considerable area of hæmorrhage into its substance. The growth extended backwards so as to involve the anterior part of the internal capsule and measured 6 by 4 by 3 cm. It reached the surface of the brain, infiltrating and destroying the grey matter of the convolutions overlying it.

Liver: large, pale yellow from extreme fatty change, with a faint suggestion of roughening due to fibrosis.

Pancreas: pale and infiltrated with fat. It was not altered in external measurement.

Left kidney: large, pale yellow from fatty change. The surface was smooth on stripping the capsule.

Spleen: normal in size, firm and rather light red in colour.

Microscopic appearances.—The brain tumour was a cellular one, the cells varying much in shape and size. They were oval, pear-shaped or branched. Many of them showed two or more nuclei. Mitotic figures occurred but were not numerous. Between the cells were fibres which stained blue with Mallory's phosphotungstic acid-hæmatoxylin neuroglia method. These fibres varied somewhat in thickness. Blood vessels were numerous and showed a marked tendency in places to thickening of their walls and in one part a striking calcification of the smaller vessels was seen. Hæmorrhages were noted, both small and large. In places the cells were widely separated by the accumulation of a homogeneous fluid, a condition no doubt antecedent to the softening observed in the gross specimen. The growth was not well defined from the surrounding brain; on the contrary, in places it was difficult to state where the tumour ended and the normal brain began. In addition to the calcified small vessels mentioned there were in places numerous spheroidal concretions, concentrically laminated, which stained blue with hæmatoxylin, and from the damage which they did to the microtome knife were obviously calcareous in nature. Their origin was somewhat uncertain. They did not arise in relation to vessels but were probably degenerated cells in the first instance round which calcareous matter is deposited. The characters of the growth thus correspond to the spongioblastoma multiforme of Bailey and Cushing, the commonest type of glioma.

A section of the cord in the upper cervical region, treated by Marchi's method, showed no degenerated tracts.

The liver showed marked cloudy swelling and fatty change, mainly of an infiltrative type. There was also some increase in the stroma.

The kidneys also showed a striking swelling of the cells of the convoluted tubules, with numerous fine fat droplets. Areas of round-cell infiltration occurred in the cortex, but the glomeruli appeared to be healthy.

The pancreas presented a striking amount of interstitial fat, a condition which is analogous to the so-called fatty infiltration of the heart. The island-tissue however appeared to be healthy.

The spleen showed no change of note.

A CASE OF ACUTE YELLOW ATROPHY

BY A. C. DUNCAN, M.D. AND MURRAY H. CAMPBELL,

Winnipeg General Hospital, Winnipeg

H.A. was admitted to the maternity ward of the Winnipeg General Hospital at 11 a.m. on March 4, 1933, unconscious. The following history was obtained from her mother, who accompanied her.

An unmarried girl of Swedish extraction, 18 years old, and about 6 months' pregnant, was apparently in fairly good health until March 2nd when she complained of a sore throat and headache. These complaints were not very severe until the following day, when the headache became worse and she developed a pain across the lower back. In the evening of March 3rd she became irrational and hard to control. On the morning of March 4th the patient sank into coma, had a mild convulsion, and was admitted to the hospital four hours later.

Past history.—For some years she had suffered from a chronic backache. She left school at the age of 14. In the summer of 1931, at the age of sixteen, she was delivered normally of a full-term child. Her second pregnancy was advanced to five or six months. There was no history of depressive psychosis, nor any other reason to suspect suicidal tendencies.

Physical examination.—On admission the patient was deeply comatose, spastic and definitely jaundiced. Within 30 minutes she was delivered naturally of a still-born fetus, weighing 15 ounces, and the placenta was removed manually a few minutes later. A gastric lavage removed much dark foul fluid from the stomach. Physical findings were negative, except for the almost complete absence of liver dullness associated with moderate jaundice. Her breathing was stertorous with acetone detectable on the breath. The blood pressure was 98/55.

Progress of the case.—At 3 p.m. she was given 50 gm. of glucose intravenously, and a colonic irrigation was done. About two hours after delivery she had a moderately severe post-partum hæmorrhage which was controlled with gynergen and pituitrin. Her condition, however, gradually became worse, the coma deepened, the jaundice became more marked, and she

expired at 5 p.m., five hours after admission to the hospital.

The following laboratory tests were carried out. A catheterized specimen of urine was obtained immediately after admission. It showed no albumin and was negative except for the presence of diacetic acid and acetone. She had a leucocyte count of 32,000. The urine showed no crystals of tyrosine or leucine, but Millon's and the special phosphomolybdotungstate reagents gave markedly positive tests for tyrosine. A sample of blood taken at this time gave the value for blood glucose as 0.04 g. per 100 c.c., and an icterus index of 64. A sample of blood was obtained about half an hour before death and gave the following results:— Urea-N= 4 mg. per 100 c.c. Tyrosine= 23 mg. per 100 c.c. (estimated colorimetrically). A catheterized specimen of urine obtained at the same time showed:— Urea-N.= 70 mg. per 100 c.c. Ammonia-N.= 116 mg. per 100 c.c. Tyrosine= 0.15 g. per 100 c.c.

Autopsy.—The liver was grossly diseased; it weighed 425 g. (about one-third the normal weight), and was very soft and necrotic. Microscopic sections showed almost complete disintegration of the liver cells. The kidneys were slightly enlarged with an abnormally greyish cut surface; microscopic examination revealed no marked changes. The microscopic examination of the fetal liver showed no hepatic degeneration.

COMMENT

The chemical findings are of considerable interest, and fit in completely with the condition of acute yellow atrophy disclosed at autopsy. The initial low blood sugar suggests that the convulsion which occurred before admission may have been due to hypoglycæmia. The low urea and the approximately normal ammonia findings, associated with the high tyrosine content of the blood and urine, are in agreement with the theory that is now usually accepted, that the liver is largely or entirely responsible for the deamination of the amino-acids, so that when its function is markedly diminished, the blood content of the amino-acids will increase, and that of the urea will decrease.

The figures present a less extensive picture than that of the more chronic case of "idiopathic acute yellow atrophy" recorded by Rabinowitch (*J. Biol. Chem.*, 1929, **83**: 333) in which he found, just prior to death, a very dilute urine containing only 70 mg. of urea-nitrogen and 63 mg. of ammonia-nitrogen, and in the blood 0.045 per cent sugar, complete absence of urea, and 0.2 per cent of amino-acid nitrogen.

SUMMARY

This is a case of an 18 year old girl, 6 months' pregnant, who within 48 hours of the onset of her acute illness developed a progressive jaundice, became comatose and showed many of the signs indicative of acute hepatic failure.

We wish to thank Dr. Ross Mitchell, of the Obstetrical Department, and Professor Cameron of the Biochemistry Department, of the University of Manitoba, for their kind assistance with this case.

INTRAPERITONEAL HÆMORRHAGE FROM A TRAUMATIC RUPTURE OF THE RIGHT KIDNEY

BY G. L. BIRD, M.D.,
Oshawa, Ont.,
AND V. E. CARTWRIGHT, M.D.,
Pickering, Ont.

Rupture of the kidney from trauma rarely causes sufficient intraperitoneal bleeding to give symptoms or require treatment. The following case is of interest, therefore, in this connection. The diagnosis was made only by exploration for a supposedly ruptured intra-abdominal viscus.

CASE REPORT

W.P., aged 29, a farmer, was kicked by a horse while in a kneeling position on July 21, 1931. The blow was received just below the ribs in the right anterior axillary line. It knocked him down and caused extreme pain, but he was able to get up and drive the team home. He went to bed and called his physician. Even with medication he slept poorly that night, and had increasing pain in the right side of the abdomen until admitted to the hospital at 8.30 p.m. on July 22, 1931. From the time of the accident he passed his urine at normal intervals and without difficulty or pain. Following the accident it was bright red in colour and on the day of admission it was dirty brown. He had had no nausea or vomiting and his

bowels had moved normally. On admission, his temperature was 97.4°; pulse 84; respiration 24. He appeared very ill and disliked to move because of the aggravation of pain in the right abdomen. The abdominal wall had a normal contour but did not move with respiration. There was relative dullness of the right flank and side of the abdomen, which was very rigid and tender, particularly just above the right inguinal ligament. There was moderate tenderness over the right kidney posteriorly. His white blood cell count was 20,000 and the urine contained albumin and much old broken-down blood. With the above findings, and because of the fact that the urine had changed in colour from bright red to dark brown since the accident, the following diagnosis was made:— (1) ruptured intra-abdominal viscus; (2) contusion of the right kidney.

The surgical approach was made by the abdominal route, at 10.30 p.m. On opening the peritoneum, a large amount of blood clot and free blood was encountered. This was found to be coming, not from the abdominal viscera, all of which appeared normal, but through a rent in the posterior parietal peritoneum over the right kidney. On enlarging this rent it was discovered that there was a huge accumulation of blood retroperitoneally and extensive laceration of the kidney through its centre into the pelvis. Palpation revealed a left kidney, normal in size and position, and the right was removed. The edges of the posterior peritoneum were approximated and the abdominal wound was closed, leaving one small cigarette drain. A transfusion of 500 c.c. of blood was given while the patient was still on the table.

Gross and microscopic description of tissues removed (Dr. J. E. Bates). — The specimen consists of a kidney, measuring 11 by 6 by 4 cm., which has been ruptured transversely about the middle. A large amount of dark brown blood clot fills the gap in the ruptured kidney. The capsule strips fairly readily in the uninjured portion leaving a reddish-gray surface. On cross section the laceration is seen to extend completely through the kidney. The pelvis is distended with old blood clot and hæmorrhagic areas are seen radiating from the pelvis toward the cortex. The uninvolved portion is gray in colour. The cortex and medulla are well differentiated. The cortical stipplings and medullary rays are fairly well seen.

Microscopically, section of the kidney substance from the region of the rupture shows the kidney substance to be necrotic in character, through which the outlines of the former kidney substance can be distinguished. A large amount of hæmorrhage is present. Section from the kidney substance removed from the area of rupture shows the glomeruli and tubules to be fairly normal in character.

Diagnosis.—Ruptured kidney with hæmorrhage and necrosis.

Recovery was uneventful, except that for a period of about ten days, beginning July 28, he had frequent involuntary movements and involuntary urination. During this period he excreted considerable sugar in his urine and was quite drowsy. This gradually cleared and on August 12 his urine was free of both albumin and sugar. This complication was thought to have been due to involvement of the lumbar sympathetic ganglia. He was discharged from the hospital on August 21, returned to work early in October, and has continued to work on the farm since. Following his return to work he developed a small ventral hernia at the site of the drainage which required support and should be repaired.

WAR ON ILL HEALTH CAUSED BY FOOD LACK.—Scientists whose knowledge of nutrition taught us how feed our fighting men during the World War are now turning their knowledge to the problem of feeding the soldiers of the depression. The fight to-day is against the "undisclosed signs of deterioration" in health resulting from malnutrition, Prof. Lafayette B. Mendel of Yale University pointed out. Disease due to lack of proper foods grows slowly. Scientists are trying now to recognize these diseases in their very earliest stages, just as bankers are trying to find ways of detecting unsoundness in banks early enough to prevent disaster. Early signs of the beginning of these diseases could be seen last year in bread lines, Professor Mendel said; and on the hands of patients admitted to the wards of Bellevue Hospital in New York, doctors saw the faintest marks on the skin which meant the beginning of pellagra. In this fight the help of the family physician who knows his patients well enough to see the development of what Professor Mendel called "subvisible disorders" is necessary.—*The Diplomate,* 1933, **5**: 185.

Clinical and Laboratory Notes

THE POST-OPERATIVE MANAGEMENT OF THE PERMANENT COLOSTOMY*

By F. B. Bowman, M.B. (Tor.), F.R.C.P. (C.),

Proctologist, Hamilton General Hospital

Hamilton

About one year ago a proctologic clinic was organized in the Hamilton General Hospital. Since then some 250 patients have been seen and 600 treatments administered. The ward patients are also seen following major rectal operations and any necessary advice or treatment given. The astounding results following the operative treatment of carcinoma of the rectum or sigmoid need not be emphasized, as these are familiar to all. The operative risk has been reduced to under 10 per cent mortality, the Mayo Clinic reporting a mortality rate of under 6 per cent. A young otherwise healthy adult with a carcinoma of the rectum or sigmoid may almost be promised recovery and should approach the day of operation in an optimistic frame of mind. It has seemed to me, however, that although the surgeon while the patient is in the hospital is in no way neglectful, he has little to offer him in satisfactorily and comfortably looking after the permanent colostomy afterward. The results of a brilliant operation have been neutralized by the presentation of a rubber colostomy bag to the patient with a few words of advice regarding the daily toilet of the colostomy. These rubber bags have always been a source of annoyance and embarrassment particularly to a patient who is at all fastidious. There is always an offensive musty odour which cannot be removed, and many a prominent man or woman cured surgically of cancer has become a recluse because of the necessity of having to constantly wear one of these evil-smelling bags. The toilet of the colostomy has always been difficult and extremely distasteful to the patient and his family.

Last year while attending the proctologic clinic of Dr. Descum McKenney, of Buffalo, a device originated by him and which he uses on his patients was shown to me. He had found it most satisfactory and illustrated this by describing a Buffalo lady who had been operated upon for carcinoma of the rectum. She was very prominent socially and a community worker. By using his apparatus she has again become socially active and mingles freely with her many friends most of whom have no idea that she has a permanent colostomy.

In collaboration with an expert mechanic I have had an apparatus made in Hamilton which seems to be an improvement on the Buffalo model. It consists of an irrigating cup (Fig. 1A) and a metal colostomy cover (Fig. 1B) made of aluminum. Passing through the cup and fitted to it by a thread is a double-ended nozzle. The tip inside of the cup is attached to a large catheter which is inserted into the colostomy opening and the tip outside of the cup is attached to a rubber tube coming from an irrigating can hanging over the patient's head. The can should hold at least a gallon as it will usually require more than this to make a successful toilet. There is a 5/8 inch metal tube on the under surface of the cup and to this is attached a large rubber tube about 12 inches long for drainage. The toilet is usually made in the morning although some patients prefer doing it at night before retiring. It makes little difference when it is done, the important thing is to do it thoroughly; a thorough colostomy irrigation can seldom be made in less than 40 minutes. The patient sits on the toilet, inserts the catheter into the colostomy, puts the large drainage tube between his legs into the toilet, holds the cap tightly against the skin and turns on the water from the can (Fig. 2). This should be allowed to run until he feels a cramp and then it should be shut off: fæcal matter comes out around the catheter and drains through the large tube into the toilet.

1A

1B

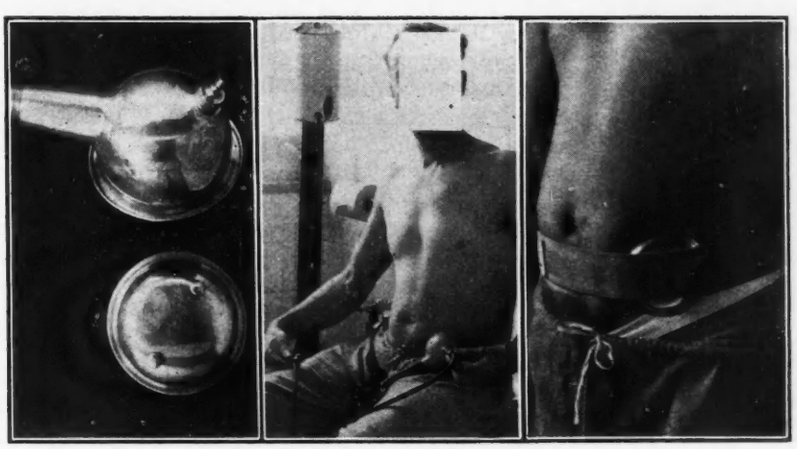

FIG. 1.—Colostomy irrigator and cap

FIG. 2.—Patient on toilet using colostomy irrigator

FIG. 3.—Cap in place over colostomy

This is carried out until there are no more cramps and no more fæcal material drains from the colostomy. If the irrigation is done thoroughly there will be no more discharge for 24 hours

*Read at the 53rd annual meeting of the Ontario Medical Association, Hamilton, May, 1933.

The metal cap (Fig. 1B), something like an ash tray, has two buttons on it which fasten it to a belt (Fig. 3). Some gauze with a little vaseline is placed in the cap, which is then placed over the colostomy and the belt fastened. Some of the patients who have this outfit say that they do not need the cap if the irrigation is done thoroughly, only a layer of vaselined gauze being placed over the colostomy and fastened with a thin bandage.

The outfit is unsatisfactory unless one takes time to explain it to the patient and perhaps helps him for a few days. A nurse trained in this work is a great help. After the operation and before the patient leaves the hospital the irrigator may be used in the ward and the saving in dressings, sheets, etc., as well as the time of the nurses, not to mention the comfort of the patient has been remarkable.

As regards the operation, when deciding on the method to be used due consideration should be given the after treatment and the use of the colostomy irrigator. The left rectus colostomy, of course, is ideal but if the surgeon prefers the inguinal region he should be certain that the opening is as far from the anterior superior spine of the ilium as possible, otherwise it is very difficult to apply the cup to the abdomen so that there will be no leakage.

SUMMARY

Practically all outfits supplied to the patients with permanent colostomies are unsatisfactory. An apparatus is described somewhat similar to one originated by McKenney which has given patients an entirely new outlook on life. In the writer's hands the device has been satisfactory in every case. It simply requires some patience on the part of the surgeon in its use and some patience on the part of the individual using it, to make life worth living.

This apparatus in a box with all attachments with the exception of the catheter may be obtained from Mr. John Schell, 86 West Ave. North, Hamilton, Ontario, to whom I am greatly indebted for painstaking mechanical ability in perfecting it.

"CORAMINE" IN ACUTE CARDIAC FAILURE

BY J. G. HENDERSON, M.D.,

Montreal

An incidental dramatic action produced by "coramine" in a case of acute cardiac failure in an elderly woman, was responsible for my having made frequent use of this drug during the last twelve months. I consequently came to the conclusion that this substance possesses decided advantages over the older cardio-respiratory stimulants such as camphor, caffeine, strychnine, alpha-lobeline.

Coramine is a 25 per cent aqueous solution of pyridine-B-carbonic acid diethylamide. For years chemists and pharmacologists have endeavoured to find a water-soluble substance exhibiting a camphor-like action which could be administered parenterally. During these investigations Faust found that pyridine derivatives decidedly showed such properties. There are three pyridine carbonic acids: (1) pyridine-a-carbonic acid or pocolin acid; (2) pyridine-B-carbonic acid or nicotinic acid, and (3) pyridine-y-carbonic acid or isonicotinic acid. It was found that the diethylamide of pyridine-B-carbonic acid possessed very interesting properties with regard to circulation and respiration.

Lagier, Uhlmann, Asher, Henderson (Toronto) and others have studied the action of coramine on the animal. Maloney and Tatum have compared its action with that of strychnine, caffeine, cardiazol, and lobeline on animals depressed by morphine, urethane, chloral hydrate and alcohol. Their conclusions are as follows: "Coramine is the more certain in effect, enduring in action and safe in administration in the presence of depression due to morphine, urethrane, chloral hydrate, tribromethanol and ether." Burgi and Gordonoff found that when coramine had been administered to frogs, the hearts of these animals were rendered more resistant to poisoning by cardiac depressants; also that this drug potentiates the action of digitalis or strophanthus. Frommel and Eisner have shown that coramine does not depress A-V conductivity and Leyko observed that it produced increased coronary flow.

Clinical references from European investigators are numerous. Coramine's strong analeptic action in circulatory failure and respiratory depression occurring in acute infectious diseases, chronic myocardial involvement, surgical conditions, accidents from the various methods of anæsthesia and poisoning by such agents as morphine, barbital, and illuminating gas, seem to be well proven.

The case I should like to report is that of a female patient, aged 65. I had been attending her for 10 days for cough, cardiac hæmoptysis and irregular, rapid pulse, the diagnosis being mitral stenosis with auricular fibrillation. She had been given very little digitalis as nausea and vomiting had ensued on completion of 90 minims within the first 24 hours.

I was then called in at about 3 a.m. and learned that she had suddenly developed dyspnoea. She showed marked pallor, and the pulse was rapid, thready and hardly perceptible at the wrist. In other words the patient was *in extremis*. Two c.c. of coramine was administered hypodermically and within an hour there was some improvement. The pulse became readily perceptible and the respirations were deeper and less rapid. A further 2 c.c. of coramine was then given hypodermically. I returned about 8 a.m. to find the patient quite comfortable. Her pulse was irregular but quite full and respirations were about normal.

This patient is still alive (July) and I believe has enjoyed her existence even with the limited activity that she is forced to follow.

Editorial

UNEMPLOYMENT RELIEF

THE first of May saw assembled in Ottawa a group gathered from all sections of Canada, representing the voluntary and official agencies engaged or directly interested in unemployment relief. This conference was sponsored by the Canadian Council on Child and Family Welfare, and was called to consider the immediate problems of administration of unemployment relief under present conditions, rather than provision for unemployment relief in more normal times.

Committees were formed for purposes of study and to prepare reports for consideration by the conference as a whole. *Health and Medical Care* was the subject assigned to a sub-committee under the chairmanship of Dr. G. S. MacCarthy, of Ottawa. The medical profession of Canada will be interested in the report of this committee and the action taken by the conference on the report. We quote from the supplement to *Child and Family Welfare*, May, 1933, which gives the official account of the conference:—

"In harmony with the understanding of this Conference, the Committee on Health and Medical Care does not desire to bring forward any resolutions, but the report which follows is a summary of the opinion expressed and agreed upon in the Committee.

1. In the opinion of your Committee, a paramount duty of the State in all its branches is the maintenance of the health of the people.
2. In our opinion, in respect to relief being given to unemployed persons of Canada with their dependents in their own homes, medical care should be included.
3. Medical care shall mean and include the services of a medical practitioner, dentist, nurses and other related care.
   In the discussion of this item, it was stated that the Committee had laid down this principle not as calling for such general provisions to be made generally applicable, but as contemplating the provision of any such services when absolutely necessary.
4. The necessary medical supplies and drugs shall be considered a part of this care.
5. Drugs and medical supplies under the meaning of these terms shall only be given upon medical authority.
6. The above services should be available through the existing channels as far as possible, and the personal relation of doctor and patient should not be disturbed.
7. Your Committee views with approval the present facilities in Canada with respect to Public Health Services, and would most respectfully urge that these services be maintained and extended.
8. A further suggestion recommended that monies available for unemployment relief from any or all sources should be made available for medical care. However, after lengthy discussion in which the possible relationship of such widespread public provisions of medical care to public health services and to any contemplated plans of Dominion aid or health insurance was stressed, it was agreed, upon division, to endorse these seven principles, as above set forth; to record recognition of the need of financial aid on a broad basis for the provision of health and medical care; but to refer the question of the provision of that aid to the Dominion Health Council for consideration at their June meeting."

It is interesting to note that medical care is coming to be recognized by responsible authorities as one of the necessities of life; one for which provision must be made under any scheme attempting to provide these necessities for those unable to secure them for themselves. There does not appear to be any good reason why one necessity of life—medical care—should be provided chiefly at the expense of one section of the community, the medical profession. We do not see why it was necessary to refer consideration of how medical care is to be financed to the Dominion Health Council, which is a public health rather than a medical care body. We can only presume that the old bugbear of Dominion interference in provincial rights, in this case the provision of medical care, was raised to frighten the conference. Obviously, if Dominion money can be used to provide food, shelter and clothing without jeopardizing the rights of provinces to take care of their indigent, there is no grievous danger in extending this assistance to include medical care.

Interesting and timely as these recommendations are, it reminds us that outside of some provision for hospitalization, the care of the indigent in more normal times has become an undue burden for the medical profession to carry. The public has complained about the costs of medical care, but the medical profession has a much greater complaint as regards the costs of indigent and semi-indigent care which is thrust upon them. The profession should unite upon some common policy, so that responsible bodies may know what is the attitude of the profession in this matter.

GRANT FLEMING

THE QUALIFICATION OF SPECIALISTS IN CANADA

IN the last decade of the nineteenth century, specialists were few and far between and each one was known by his confrères to have studied and "walked the hospitals" abroad to obtain his special training. They were often looked down upon by general practitioners as faddists, and were not considered worthy of consultation. As a recognized form of practice, specialism could hardly be said to exist. From this small beginning it has grown with phenomenal rapidity during the last few years, so that now approximately 35 per cent of practitioners restrict their practice to some special field. The number of specialists has indeed grown so large that it has become impossible to know which have had an adequate special training and which have not. While many have spent several years in post-graduate work to qualify themselves in their specialty, others have put in a scant few months, and neither the public nor the medical profession have any means of knowing by which channel they entered their specialty, and yet the medical profession and the public have a joint responsibility in guaranteeing that those who claim to be specialists are in fact experts in their fields. A particular identification for those who profess to be specialists should be created, such a recognition to be granted only on evidence of the successful completion of a training which, in the opinion of competent physicians, is adequate to prepare the individual for practice in the limited field.

At the round-table discussion of the Ontario Medical Association last year, many views were expressed on this question of specialists. Similar discussions are taking place in the other provinces. Should each of the provinces proceed to draw up regulations and adopt laws, a situation will be created very similar to that which now exists regarding licensure to practise, with vested rights and other conditions, which have prevented the original ideas of the late Sir T. Roddick from coming to their full fruition, with one portal of entry to practice for the whole of Canada. Is not now the time to avoid different standards and different methods in the regularization of specialists in Canada by devising some common minimum standard of qualification for the practice of the specialties? Such a standard of qualification might bear the same relation to any provincial legislation as the present licentiate of the Medical Council of Canada has to registration for practice in any of the provinces, *i.e.*, it is a certificate issued by the Medical Council of Canada which is accepted by the Councils of the provinces as evidence that a graduate in Medicine has attained a certain standard of education and has passed certain examinations.

If a minimum standard of qualification for the practice of the specialties is to be adopted in Canada, is the Medical Council of Canada the body which should undertake the administration of the regulations and examinations for this qualification? The purposes of the Medical Council of Canada, as provided for in the Canada Medical Act, might include a further clause regarding specialists as follows:—

The purposes of the Council are also to promote and effect

(*a*) the establishment of a qualification for the specialties in medicine, such that the holders thereof shall be acceptable to practise their particular specialty in all the provinces of Canada;
(*b*) the establishment of a register of specialists for Canada, and the publication and revision from time to time of such register;
(*c*) the determination and fixing of the qualification and conditions necessary for registration as a specialist, the examinations to be undergone with respect to the subjects of their particular specialty only, and generally the requisites for registration: provided that the Council shall not determine or fix any qualifications or conditions such as might conflict with any regulations heretofore provided for by the provincial authorities;
(*d*) the establishment and maintenance of boards of examiners for examinations and granting of diplomas of qualification in each of the specialties.

Under such an amendment to the Act, it would be necessary for the Council to draw up regulations for making the above clauses effective. Provision would, doubtless, be made for the acceptance of certain post-graduate degrees, examinations, diplomas and fellowships, in lieu of those prescribed by the Council. For example, those holding such qualifications as the F.R.C.S. of England, Edinburgh or Canada, or the M.R.C.P. would be exempt from any examinations and be registered if all other conditions are fulfilled and a small registration fee paid.

It has been suggested that the holding of one of these Fellowships should be the standard of qualification for all specialists, but if such a method were adopted, the

number of Fellows created would be so large that the value of holding such a Fellowship would be depreciated enormously and the objects of the Royal Colleges in setting a high standard would be thereby defeated. The creation of some standard of qualification that lies midway between the high one of the Royal Colleges and the ordinary one of graduation and licensure would appear to be the desirable objective for qualifying a man to undertake the practice of a specialty. Such a standard of qualification might be determined by a body like the Medical Council of Canada and the diploma or certificate granted by them be accepted by all the Provinces.

Before a man would be eligible to sit for such a specialist examination, the Council might require him to fulfil certain educational and training requirements of somewhat the following nature:—

1. That he is a graduate of a recognized university of at least three years' standing and is licensed to practise in one of the provinces of Canada.
2. That he has spent not less than two years graduate clinical work in the particular field in which he is specializing, in which there is included sufficient training to attain a superior knowledge in the fundamentals which underlie diagnosis and treatment in this field.

The Specialist Examinations of the Dominion Council might be conducted in the various centres in Canada, as is done at present for the licensing examinations. Boards of Examiners in each of the Specialties in which there are eligible candidates would be appointed by the Council.

The Council would publish a Register of Specialists for Canada in which would be recorded all those who had obtained a Specialist Diploma of the Council, or whatever name the Council may decide to give the qualification. Provision might also be made for the inclusion of all specialists who have been in practice for a certain period of time, five or ten years, in a manner similar to the registration of practitioners by the Council, provided they had been licensed in a Province before the inception of the Medical Council in 1912 and had been in practice at least ten years.

The above method for providing for registration of specialists in Canada is thrown out as a suggestion for consideration and discussion. Whether these or any other suggestions are adopted it is hoped that, whatever action is taken, whatever amendments to Dominion or Provincial Acts are enacted, whatever regulations are laid down, they will be such as to make a uniform standard for the qualification of specialists for the whole of Canada which succeeding generations of practitioners will look back upon as effective and satisfactory for the purpose for which they were devised and at the same time as adjustable to the new conditions which the passage of time will make inevitable. E. STANLEY RYERSON.

Editorial Comments

The Mental Institutions of Canada

The Dominion Bureau of Statistics has been making an exhaustive study of hospital data, in connection with the 1931 census of Canada. The analysis of the returns from Mental Institutions is now available in bulletin form (Bulletin No. 1) and that relating to general and other special institutions will be available in the immediate future. A study of the report reveals some very interesting information. On December 31, 1931, there were registered 26,079 insane patients and 5,980 mental deficients, a total of 32,059. This was an increase of 4,611 during the year. The figures from the census of 1911 cannot be compared very accurately, as the mental institutions which reported 9,671 patients were not as commodious as at present. In that year the number of insane and idiotic people in Canada was reported to be 13,355. In 1921, the patients in mental institutions were 21,516. During 1930 the increase in the number of patients was 1618, or 5.6 per cent, although the actual number of patients admitted was 10,059, including 7,532 first admissions. Prince Edward Island was the only province showing a decrease, while Saskatchewan showed an increase of 206, or 9.9 per cent.

The most common psychosis reported among the 31,172 patients registered on June 1, 1931, was dementia præcox (12,662 patients); this was followed by the manic-depressive group (2,760); paranoia and paranoid conditions—listed apart from dementia præcox—(1,607); senile psychosis (1,316); epilepsy (1,247); general paralysis (624); mental deficiency (572); involution melancholia (513); arteriosclerosis (437); alcoholism (301). There were 127 cases of cerebral syphilis. Of the 7,484 patients without psychosis, 6,917 were classified as mental defectives and 492 as epileptic.

Twenty-one per cent more males than females

were registered. Approximately one-third, 20,526, were single; 8,514 married; and 1813 widowed. In view of the agitation in England for easier divorce in such instances, it is noted that but 98 patients, or a little over 1 per cent of the married patients, are listed as divorced. Of professional as well as social interest is the observation that during 1930 there were 52.5 discharges per 100 admissions. Of these 14.3 (27.2 per cent) were discharged as recovered and 26.9 (51.2 per cent) as improved.

The total expenditures of the mental institutions for maintenance in 1930 was $10,484,836; including improvements and new buildings the total expenditure was $13,448,105. H. AGNEW

The Forgotten Man in Medicine

The medical student of to-day must often wonder, if perchance that faculty of the inquiring mind has not been dulled in him by the acquisition of too many facts, how the practitioner of a hundred years ago managed to save his patients. So little of the knowledge available at the present time was dreamed of then; so few of the modern aids to diagnosis were accessible to the physician of a century ago. Despite that drawback, the doctor then did creditable work. In what field did his strength lie? His handicaps were offset to a great extent by the fact that, instead of treating his patient as a group of symptoms, he treated him as an entity. Not having so many facilities for investigating the individual bodily functions, he was compelled to administer to the whole patient.

To-day this is materially altered. We look at the patient's x-ray plates; we examine his sputum, we determine his blood chemistry, we titrate his stomach contents, we measure his phthalein excretion and estimate his liver function. He almost ceases to be an ailing human being, and becomes a series of laboratory diagnoses. Now these are all very important, and their value should not be minimized. They have made possible the many advances in medicine, but it should not be forgotten that they are merely expressions of a very complex mechanism that constitutes a human being; the patient for whom the medical profession exists.

The great question of what made this man have all these symptoms is too often neglected. In the past, the family doctor knew the family, its peculiarities, its failings, its reactions to its environment. To-day the doctor, in cities at least, sees too often only the patient, knows nothing of the family, and is apt to investigate it less. In reading over hospital histories taken by internes, one is struck by this fact repeatedly. "Family history negative" is written again and again on the record sheets. Such a statement means that in 95 per cent of the cases, the interne was too indifferent or too uninformed to take an intelligent family history. Even the patient's own history is too often so scantily taken as to be of no value. The more careful taking of the history involves more time, but it repays the doctor in his better understanding of the case. Numerous examples might be cited but one illustration will serve.

A child whose skin was dry and scaly, whose hair was sparse, and who showed very much delayed dentition was treated as a hypothyroid case, and given thyroid extract. The child who suffered extremely in hot weather, became more uncomfortable under the treatment, and finally refused the medicine. Another physician to whom the child was taken, took the family history, found that numerous other members of the family had the defect of too few teeth, and saw in the child, not an expression of hypothyroidism, but an accentuation of a family tendency toward ectodermal deficiencies exhibited in the lack of sweat glands, diminished supply of hair, and too few teeth. The thyroid extract had increased the metabolism of a child who was already suffering from inability to regulate his body temperature through evaporation. Appreciation of the family history could not reconstruct teeth or sweat glands, it is true, but it could save the patient from an irrational and actually harmful therapy.

Psychiatry has done a great deal to help us focus, not so much upon isolated symptoms and laboratory diagnoses, important as they are, but upon the whole personality, upon the sick man or woman before us. When medical thought has become permeated with an even greater extension of this idea, namely, focussing upon the patient as a product of his ancestry, studying his reactions, his diseases, his bodily make-up from the standpoint of his heredity, the practice of medicine will have made a long step forward. The ancestor, immediate or remote, constitutes the forgotten man in medicine. He represents an influence as potent as the environment in the determination of the disease from which the patient suffers. Not only will the remembering of this forgotten man in medicine help the physician to understand the patient's needs from the purely personal standpoint; it will enable him to make a more accurate diagnosis in the realm of non-infectious diseases, to make it earlier in the course of the disease, to seek a more rational therapy that aims at the underlying cause of the illness, and in many cases to institute preventive measures before the disease has actually developed. M. T. MACKLIN

The Canadian Formulary and Reference Companion

We are advised by the Department of Pensions and National Health that the new Canadian Formulary is now off the press, and that it may be regarded as a standard work for the purposes of the Food and Drug Act.

Retrospect

POLIOMYELITIS*

By N. B. Gwyn, M.D.,

Toronto

Following so closely upon the survey of Epidemic Encephalitis made by the Matheson Commission of New York, this work will at once attract general attention, for it would appear to be the most comprehensive work on the subject extant.

The first chapter, "the history of poliomyelitis," by Miss Hutchins, is no less interesting than other sections in its complete review of the steps over which our knowledge of infantile paralysis has come to us in the last century. It is interesting to have put before us the fact that up to Heine's descriptions of "paralysis of infants of flaccid type," in 1840, there had been but one group of such cases so described that one could recognize the disease as we now know it. This particular group, detailed by Badham, as occurring in Worksop in the year 1835 is stated by the historian to have been better placed before the medical world than the few scattered cases reported by other observers from time to time, and stimulated by Badham's accurate descriptions, Heine began to put together certain cases which were appearing before him in the course of his orthopædic investigations. The result is of course a matter of history, and it is pleasing to note that Heine's publication in 1840, made without the assistance of pathological material, since none was forthcoming, contains most of what we recognize to-day as the clinical picture of the flaccid paralysis of infants and adults. Medin's contribution, made 37 years later, completed the picture, and so completed it that Wickman, still 20 years later, makes the suggestion that the disease might well carry the name of these two observers, hence the appellation often heard of "Heine-Medin's disease." Other important sign posts along the road the disease has travelled to reach us in its well-labelled form, were the recognition of an "encephalitic type" of the disorder by Strümpell and Marie in 1884 and 1885 respectively; the description of the non-paralytic type by Calverly in 1894; and the classical accounts of Wickman, whom we have mentioned above, which appeared between the years 1905 and 1910.

The historical summary concludes with a recognition of the great importance of Wickman's investigations, investigations which went far to establish the fact that poliomyelitis was really an infectious disease; Miss Hutchins allows us, moreover, to realize that Wickman verified Medin's conception of the disease as an etiological entity, and that he had a very clear idea of the manner in which the disorder spreads through a community. He was not only able to prove in many instances that direct contact took the disease from one victim to another, but he has also to his credit the suggestion that in spreading poliomyelitis the unsuspected healthy "carrier" played an important part.

One cannot here give place to the many theories of causation and the various attempts to link up poliomyelitis with this or that well known micro-organism of the grosser sort, or with this or that variation in a patient's surroundings. Dr. Harrington's chapter on etiology is a mine of information for anyone who is interested in the many ways in which investigators have been able to deceive themselves, even with the finding of Landsteiner and Popper before them. "Secondary infection and contamination" may well be written over the contributions of the numberless workers in the field who have held to the idea that poliomyelitis is a coccal or bacterial infection, while "imperfect control" explains the majority of those findings which do not follow the careful steps of the just mentioned observers in 1908 or the accurate leads of Flexner and his co-workers. The careful detailing of the long search which has ended in the establishing of the fact that poliomyelitis is due to one of the filterable viruses is extraordinarily well told by the writer of this particular chapter, and no detail which has to do with the nature of the virus or the path by which it travels in the body to reach the anterior horns seems to have been omitted. The chief steps in the climb of etiological research may be stated to have been first, Landsteiner's and Popper's demonstration in 1908 that the disease could be transmitted to monkeys by the inoculation of affected cord and brain tissue, and their suggestion as to the nature of the virus; secondly, the cultivation of the virus by Flexner and Lewis, 1910, and the detection of the "globoid bodies"; thirdly, the determination that these globoid bodies were but an associated growth; fourthly, the discovery that the virus could be preserved in living state in glycerin and was of the so-called "filterable" nature; fifthly, the finding that the intracerebral inoculation enhanced the chances of infection in the experimental animal and even determined the localization of the lesions in the anterior horns of the cord; sixthly, the recognition of the fact the monkey was the animal of election in all ex-

* Poliomyelitis; a survey made possible by a grant from the International Committee for the study of Infantile Paralysis, organized by Jeremiah Milbank. Price $6.00. Williams & Wilkins, Baltimore, 1932.

perimental work and that in these experiments, spinal, bulbar and cortical types of the disease could be recognized.

The sections which deal with the methods of inoculation—intra-venous, intra-peritoneal, intra-nasal, intra-cerebral, etc., make interesting reading for those who concern themselves with the spread of the disease in the epidemic invasions of our times. The studies in connection with the determination of the nature of the infecting agent are particularly complete; the discussion on the infectivity of nasal and pharyngeal washings from human patients and from healthy carriers is valuable to a degree, and seems to prove conclusively that secretions from the upper air passages are the actively infecting substances. An excellent chapter on the spinal fluid alterations met with in the disease is included in the etiological studies, and a short sketch of some preventive therapeutic measures is added in conclusion.

A chapter of 50 pages on Resistance and Immunity is contributed by Dr. Helen Harrington. The mechanisms of defence possessed by the body are first discussed. The writer touches upon the low case-incidence of the disease and on the possibility of there being a natural resistance to the passage of infection on the part of the mucous membranes of the respiratory tract. She refers to the opinion of Flexner and his co-workers "that the normal nasal mucous membrane plays an important part in preventing infection of the central nervous system." Their demonstration that an intact choroid plexus may also prevent infection is also brought forward. The suggestion that in many persons, there exist certain immune non-specific bodies which will prevent ready infection, is put before us, and of this, as the writer states, there is abundant confirmatory evidence. In further discussing the problems of resistance and immunity she stresses the fact that one attack of poliomyelitis usually confers protection in both human beings and the experimental animal, and that, as shown by Levaditi and Landsteiner, the serum of a monkey convalescent from the disease neutralizes the virus *in vitro*. The interesting statement is made that "after infection antibodies appear early in the blood, and remain through life." These bodies are not so regularly found in the spinal fluid or nasal washings. Particularly noteworthy is Dr. Harrington's reference to the natural neutralizing power, with regard to virus, of the sera of certain breeds of adult monkeys, and of certain races of human beings who have no history of poliomyelitis ever having invaded their lands. The nature and the method of action of the neutralizing bodies is taken up at length. These bodies do not kill the virus, but unite with it or with its toxins in some sort of "toxin-anti-toxin reaction"; fresh complement is not necessary for the taking place of this inter-action. The writer tells us that many observers have suggested that in the human body there may develop with greater or less regularity a certain degree of physiological or biological immunity to poliomyelitis, hence the relative immunity of adults.

Interesting notations are to be found in the chapter concerning the specificity of the reaction of neutralization, of allergic reaction following the use of serum, and of the presence or absence of complement-fixation bodies in immune sera. Precipitin reactions are also discussed. The question of active immunization is given most consideration. All investigation along these lines follows of course the recognition of the fact "that active immunity can be attained only when some degree of reaction to the living virus has taken place." The virus of poliomyelitis is inactivated by heating to 55° C.; subcutaneous injection of virus thus treated is harmless, but ineffective as regards protection. Attenuation by heat, drying or by chemical methods, leaves a virus incapable of producing any real degree of immunity. We are reminded that the preparation of the immunizing virus for rabies is by the method of drying over caustic alkalies. The use of living unattenuated virus in the attempt to protect the experimental animal has not been met with any great degree of success. The virus has been introduced into the animal through many portals, and at times infection rather than protection has resulted. Some successful results have been obtained by the subcutaneous, the intra-cutaneous, the intra-nasal, and the intra-splenic methods of inoculation. Introduction of the virus into the gastro-intestinal tract, the respiratory tract, into the nerve trunks and into the brain itself has given but little protection; it is noteworthy as the writer states that no local immunity develops in the brain tissue itself at the site of inoculation of the virus.

A good account is given of the attempts to produce immunity by the injection of virus after the administration of protective sera and by the injection of virus mixed with various sera whose inactivating power had been brought to a high level. The writer seems to be convinced that no great protection has been conferred upon the experimental animal in this way. Serum-protection, or the conferring of a passive immunity, is well discussed, as it should be in the face of the results claimed by various experimenters. As is well known, it was shown early that the serum of convalescents contained properties effective in neutralizing the virus of poliomyelitis *in vitro* and *in vivo*. The work of Flexner and Lewis is frequently referred to. These workers had some success in protecting animals against the intra-cerebral inoculation of the virus if convalescent serum had been administered previously by the intra-spinal route. Some degree of protection against intra-nasal inoculation was conferred by the same process.

Flexner and his associates showed at the same time, that treatment instituted against any form of inoculation must be started early if any results were to be hoped for.

Chapters IV and V, by Josephine B. Neale, on Symptomatology and Treatment, will appeal to clinicians in their completeness. A short historical summary of the development of our knowledge of the clinical manifestations is given, and one recognizes how little was known of the very existence of what must have been a common disorder until Badham and Heine made their observations. Heine's description of the disease as something "which attacked young children in excellent health, signalizing its onset so often by febrile disturbance and upsetting of the digestive system or with some signs of infection in the upper air tract," is referred to, and it is further noted by the writer that he stressed the rapid improvement noted after the first few days and the absence of mental deterioration. Heine also studied carefully the distribution of the paralyses. According to the writer of these chapters, Colmer in 1843, noted the first American cases. Seeligmüller described accurately the occurrence of pain at the time of onset in many cases, and, in 1884, as we know, Strümpell detailed the type of case spoken of as "polio-encephalitic." Her story of the disentanglement of this type of the disease from the confused mass of "cerebral palsies of children" is remarkably well told and the part played therein by Strümpell and Marie is suitably stressed. Medin is given recognition for his suggestions that the disease "poliomyelitis" is a general disorder affecting, cord, cortex, nerves, pons and medulla. Cordier is given the credit of first describing the so-called "bulbar" forms, while Caverly, the well known student of the Vermont epidemic, is shown to have described clearly the non-paralytic type.

Dr. Neale gives the incubation time of poliomyelitis as from 7 to 14 days. She describes carefully the various forms of onset, stating that one usually sees:— (1) acutely developing symptoms referable to the gastro-intestinal and respiratory tracts; (2) a febrile state lasting four to ten days; (3) a generalized hyperæsthesia, with or without meningeal symptoms and at times associated with increase of reflexes; (4) the development of the paralyses from the second to the eighth day; (5) a rapid improvement as the febrile wave disappears. She refers to the so-called "dromedary type" of onset, seen in the New York epidemic, in which a fever wave of two or three days' duration, disappears only to be followed by a second wave with its ensuing complications. The localization of the paralyses is described, with the note that the sphincters are rarely if ever affected. The bulbar type and the Landry type of the disease are given full descriptions, and it is interesting to note that in the latter type the paralysis ascends rather than descends. Weisenburg is given as authority for the statement that in 168 deaths from the Landry type of poliomyelitis, 84 showed an ascending progression of the paralysis and only 17 descending progression. As might be suspected, he attributes all these deaths to respiratory paralysis. Neale and others note that every nerve except the auditory has been found to be involved at times in poliomyelitis; there is some doubt however as to the involvement of the second, though some claim to have seen optic neuritis. An important reference is made to the work of Paul in 1931, proving by inoculation of nasal and oral washings that a real abortive type of the disease does exist.

Types of the disease according to Neale are: (1) the abortive, in which the cerebrospinal system is not involved; (2) the non-paralytic in which the cerebrospinal system is attacked, but without leaving paralyses; and (3) the well recognized type with sub-cortical paralyses. She notes that at times the virus may attack parts other than the anterior horns, and refers to the encephalitic and ataxic types, suggesting that in the latter the columns of Clarke are affected. Other interesting classifications are given, and there is an interjected debate as to whether the encephalitic form already referred to really exists. In this connection it is noted that many of Strümpell's cases would to-day be called encephalitis of the lethargic type, that Holt and Howland omit any description of an encephalitic form of poliomyelitis, and "that the virus of poliomyelitis has never been isolated from a case in which the diagnosis of encephalitic poliomyelitis has been made." She admits, however, that in animals the picture is more suggestive and that the virus from the cortex in the inoculated monkey may be highly infective. In most of the human cases subjected to careful examination post-mortem, an acute meningo-encephalitis has existed as a complicating condition. The real lesions are to be found in the pons and medulla. The many cases of infantile hemiplegia are not all to be looked upon as post-poliomyelitic conditions. Spastic paralysis following poliomyelitis is a rare event. The writer states that relapse may occur even as late as two months after the original attack and that there are on record a few instances of second attacks of the disease.

An excellent summary of the various laboratory aids useful in diagnosis is given; diagnosis from other diseases of the cerebrospinal system is briefly and satisfactorily discussed; prognosis with special reference to the value of the cell count of the spinal fluid is carefully touched upon; and an elaborate summary of treatment, prophylaxis, quarantine, is included, which in the present state of our knowledge is valuable to a degree. One notes with interest the statement that the various antiseptic gargles are

probably harmful in that they may destroy the viricidal powers of the mucous membranes; normal saline meets however with approval. The great questions in the line of treatment—the conferring of passive and active immunity—are splendidly handled and the writer's familiarity with the problems connected therewith clearly shown as the main points in the question are discussed. To her mind passive immunity yields greater promise, and the protection conferred by the use of convalescent serum seems to have been demonstrated. She seems equally clear in her demonstration that once the disease has gained its foothold the use of curative sera has but little chance to influence its course. The remarkable collections of the New York Board of Health and of the New York Academy of Medicine have been freely used in this particular study and seem most convincing. Many reports from other districts in which poliomyelitis has been rife in recent years are carefully analyzed in reaching her conclusions. The Manitoba and Ontario epidemics of recent years are referred to, and their encouraging figures given due weight. The good results of lumbar puncture are stressed; the use of non-specific sera is discussed, and one is taken carefully over the steps by which we arrived at the stage of employing convalescent serum, either as a prophylactic or would-be curative measure. The after-treatment of paralyses and the treatment of respiratory paralysis is interestingly gone into. Treatment by drugs receives the mention it merits.

The fifty pages devoted to the pathology of poliomyelitis by Dr. Helen Harrington make a study in themselves. Twenty-four plates, black and white or coloured, illustrate the processes as they are described. An interesting history of the earlier suggestions and findings is given, and one is reminded that Heine made most reasonable guesses as to the lesions in the nervous system, considering the fact that he had at his disposal no autopsy material whatever. The long discussion as to whether the disease was primarily parenchymatous or interstitial is carefully gone into, and we are shown that Charcot, holding steadily to the former idea, was finally convincingly supported by Rissler in 1888, who also described, for the first time the inflammatory lesions elsewhere in the body, noting particularly the enlargement of the Peyer's patches of the intestine, of the mesenteric glands, and of the spleen. Dr. Harrington quotes Wickman as saying "that Rissler was the first to give a comprehensive description of the pathologic-anatomical processes of the acute stage." She relates the interesting fact that both Charcot and his pupil Cornil, in their report of the first microscopical examination of a spinal cord from a case of poliomyelitis had overlooked the significance of the absence of the ganglion cells although describing the condition. Two years later (1865) Vulpian described this characteristic pathological picture of the disease, but again, as Romer notes, "these authors observed the condition, described it, but did not appreciate that it was the one thing by which the paralysis could be explained." It was permitted to Charcot, however, as Dr. Harrington tells us, to correlate lesion and symptoms, and his descriptions with Joffroy, in 1870, laid the true foundation of all subsequent microscopical pathology—the motor cells and not the neuroglia were the seat of the primary lesion. According to Dr. Harrington the occasional involvement of the white matter of the cord had led von Frey to distinguish "leuko-myelitis and polio-myelitis," a step which in turn brought from Küssmaul's clinic the name by which we know the disease to-day "poliomyelitis anterior infantum, resp. adultorum."

The many problems in connection with the pathology of the disease are fully discussed. We are frequently reminded that although in the final stages the destruction of the anterior horn cells remains the most obvious lesion, yet all investigation goes to show that in the beginning a general involvement of all nerve tissue is the process; even cortical cells may show change in the form characterized by encephalitic symptoms. The pia mater of the brain or cord is frequently the seat of extensive infiltration. From the standpoint of the pathologist, one is tempted to say that the existence of an encephalitic type of disease is well recognized, but that the lesions are more usually of a meningitic nature. Involvement of the bulbar nuclei has of course been a frequent association of the encephalitic type of poliomyelitis. A relation of localization of the disease process in the anterior horns to the many arteries of the anterior part of the cord seems to have been established; it seems also likely that the disease spreads along the lymphatics of the blood vessels, of the nerves, and of the cord, and possibly may be carried by the spinal fluid along the arachnoid space, affecting gray and white matter alike, though in different degrees, and showing the well known tendency to destroy the cells in the anterior horns. Acute inflammation with perivascular infiltration and compression of vessels rather than thrombosis is the essential lesion. The microscopical changes in the nervous tissue, as detailed by Flexner, Peabody, Draper and Dochez, are quoted in full. These observers are of the opinion that a meningitis begins, the process which is apt to be more marked about the vessels entering the anterior fissure about the lumbar and cervical enlargements of the cord, or in certain cases, over the brain surface itself. The experimentally produced disease and that seen in the human subject have identical pathological findings.

The portal of entry forms the subject of a separate enquiry in the discussion of the path-

ology. Experimental work is well analyzed and the conclusion that the upper respiratory tract, the naso-pharynx, and the olfactory nerve form the highway over which the virus travels to reach the brain and cord seems justified. One may note in passing that the reactions in the spleen, and in the lymphatic glands of the abdomen have instigated most careful investigation of the intestinal route as a portal of entry, and inquiry as to the possibility of the virus even being able to travel along vagus or sympathetic systems. The virus has been hunted in every organ of the body, and the late Dr. Brebner was of the opinion that the intra-splenic inoculation gave enough in the way of positive results to suggest further work along this line.

Under the heading "Acute stage and pathogenesis" the main pathological characteristics of poliomyelitis are described, pictured, and discussed. Here one will find, first the views expressed by every observer of note, and next all that can be considered necessary to fix the pathological picture in his mind; the acute stages with meningeal and perivascular reactions, the consecutive picture of destruction of neuro-fibrils and disappearance of anterior horn cells, the evolution of the microglia, are accurately depicted. Neuronophagia is given much attention. Remarkable coloured reproductions of cell-inclusions are put before us. Questions as to the method of spread of virus and localization of early lesions are again discussed; it would seem quite evident that there is still some difference of opinion as to where the first signs of the onslaught may appear, whether in the meninges or in the nerve substance. If in the meninges, of course, it would seem to support the view that spread by the bloodstream plays an important part.

An anatomical basis for observed clinical types has been sought for by Dr. Harrington, and from the evidence produced one can say that encephalitis may be present in less than 10 per cent of the human cases. The lesions never show the classical picture of poliomyelitis in widespread form; a meningitis with perivascular infiltration of the underlying pial vessels is the usual finding, and only rarely does one see deeplying vascular involvement or the typical destruction of neurons in the cortex or basal area.

No student of the disease can afford to forego the study on epidemiology by Dr. Mildred Weeks Wells, for after all, the spread and incidence of poliomyelitis is a matter of world-concern. The valuable studies made by the United States public health commissions, the reports of the League of Nations epidemiological committees, the findings of the Rockefeller group, and of the various boards of health the world over, are made free use of. The splendid contribution of the Vermont public health commission, a memorial to Charles F. Caverly, is frequently referred to, and from the amazing collection available, a chapter invaluable in its completeness has been evolved. According to the writer, there has been a genuine increase in the incidence of poliomyelitis. "Poliomyelitis only became notifiable when its frequency and gravity made it necessary," answers easily the objection made that we think the disease is increasing because now we have been made aware of its existence. The increase may be due to; a change in the character of the host; a change in the quality of the virus; a change in the factors which have to do with its transmission. A long discussion on these three vital points is well conducted.

The "epidemiology of the disease" is gone into with all completeness. It is of interest to note that the large epidemics of the disease have been almost entirely confined to the colder climates; poliomyelitis spreads even in the coldest weather and has been met with north of the Arctic circle. As we see it from time to time in our communities we have often noted that the epidemics tend to appear and run their course in summer and early fall. As Dr. Wells reminds us, the explanation of the seasonal incidence of the disease is not by any means easy to explain. Droplet infection is a common method of spreading various infectious disorders and probably plays the largest part in the spread of poliomyelitis, but why droplets elect to perform chiefly in the late summer and fall, where poliomyelitis is concerned, must be a circumstance linked up with the unknown changes in the host, virus, and factors of transmission. Details related to periodicity of the disease, its incubation, its case fatality, are carefully gone into. The painstaking reproduction of statistics from all quarters of the world attracts attention and must be of untold value to any health officer interested in the problem of poliomyelitis when and as it may attack his community. The discussion on contact, carriers, period of contagiousness in patients and carriers, is well thought out.

In connection with the "epidemiology of the host" age incidence, "virgin soil epidemics," and morbidity rates receive special attention. Page after page of well-ordered statistics are before us for inspection, as the writer refers to the voluminous contributions which she has so well sifted and analyzed. The great question of resistance and susceptibility are suitably touched upon; the important details bearing upon the existence of the neutralization power possessed by normal sera are given due weight. The constitutional factors influencing "Host resistance" are given a chapter to themselves. As Dr. Wells puts it "There is no test by which persons who are susceptible to poliomyelitis, may be distinguished from those who are not, except the failure of their serum to neutralize." Unfortunately, however, a monkey is needed for each test. She notes that there may be a local re-

sistance to infection; this may be due to (*a*) neutralizing power in the naso-pharyngeal secretions; (*b*) to the fact that the nasal mucosa may be impermeable; (*c*) to the added fact that the meningeal choroidal plexus may serve as a barrier. The possibilities of endocrine influence, of physical conformity (Draper) or of inheritance being factors in influencing resistance to infection is well debated.

On the "mode of transmission," as connected with the epidemiology of poliomyelitis, a most complete chapter has been written. Infectiousness, contagiousness, reservoirs of virus, latent immunization, are exhaustively gone into. Special mention is made of Wickman's painstaking studies in the ferreting out of paths of transmission. Landouzy's suggestion that myelopathies are infectious is quoted, while according to Dr. Wells, Medin's reports led to the general acceptance of the idea that poliomyelitis was an infectious disorder. Landsteiner and Popper, Flexner and Lewis were, of course, the first to demonstrate the actual infectiousness of the disease.

The interesting problem of "Maturation" is concisely put forward. There is, as Dr. Wells tells us a certain general resistance to infection on the part of human beings which increases with age. This may be non-specific in character, or it may be that anti-bodies develop with age, much the same in character as those produced by infection. The arguments against the idea of maturation are given briefly from Aycock's summaries; they are as follows: (1) it is not found in an animal not known to have been exposed; (2) experimental immunity has been produced only by the particular disease virus; (3) immunity develops only under circumstances in which association with the virus is possible; (4) the development of immunity follows laws of infection and does not follow any law of maturation. As pointed out, it does not occur when the virus is absent. In areas in which the virus is present, it varies in accordance with variations in opportunities for exposure. Thus, while in a general way, it increases with age, this varies with the concentration of population in a manner consistent with variation in opportunity for exposure and inconsistent with any law of maturation; (5) in the case of diphtheria, ample evidence is available to show that the distribution of this organism is of sufficient extent to account for the observed adult immunity to diphtheria."

He concludes that "one is led to believe that what has been called pan-immunity is evidence of pan-infection."

The possibilities of a non-human method of carriage are fully discussed. Milk-borne epidemics are dissected and analyzed; remarkable collections of charts are displayed in this connection. The parts which may be played in the transmission of poliomyelitis by water, fomites, insects would seem to Dr. Wells to be but minor. One must conclude the review of this chapter by saying that its perusal will reward anyone who wishes to have a working knowledge of the means by which the secrets of the disease's spread have been probed into. Wickman's charts relative to the epidemiology of the Swedish outbreak are particularly interesting. These charts and geographical plans have had much to do with the recognition of the part played by the unsuspected carrier.

Following the bibliography an addendum has been inserted relative to the protection of an exposed community by the administration of normal adult serum. This investigation was carried out by the lamented Dr. Brebner and bears inspection. Further reports are to follow.

One recognizes that a review of a work of 500 pages, most of which is related to the careful collecting of facts and the detailing of experiments, must omit much that is of value and interest. One hopes however that the Milbank committee will recognize in this endeavour a wish to interest the profession in a publication whose value can scarcely be overestimated.

INTRAVENOUS ADMINISTRATION OF WHEAT GERM.—In the belief that many patients with pellagra die because they are unable either to ingest the necessary food or to retain it if ingested, Dr. T. D. Spies, of the Cushing Laboratory of Experimental Medicine in Cleveland, decided to try parenteral therapy. From among the numerous diets, drugs, and minerals that have been recommended in past years for the treatment of pellagra he selected wheat germ. From this he prepared a solution rich in vitamin B and poor in lipoids and protein, and in the first place administered it in a 10 per cent solution in normal saline to laboratory animals without any apparent injury. Dr. Spies then tried the same solution upon himself and upon 20 patients in the general medical wards of Lakeside Hospital. Six pellagra patients on a restricted diet were subsequently treated with repeated injections of this solution and showed definite improvement. Four pellagrins with severe vomiting were given intravenous injections without any food. After two or three days the stomatitis improved and the patients asked for food. This was no longer withheld and the patients recovered without further vomiting. The intravenous treatment was occasionally followed by a mild chill, and in one instance by a transient phlebitis. Dr. Spies presents these results without claims as to the therapeutic efficacy of the preparation, and points out that intravenous injections of wheat germ are only indicated when alimentary assimilation is not possible. —*The Lancet*, 1933, **1**: 1310.

Special Articles

ON MEDICAL INTERNSHIP*

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Montreal

"Every Student an Intern in his Graduating Year." This has been our motto for the last few years in the Faculty of Medicine of the University of Montreal. Why we originally adopted such a complete change in the curriculum of the fifth year is explained by two considerations, first, the necessity for providing our affiliated hospitals with a suitable staff of interns, and, secondly, the great value of putting the students in intimate contact with abundant clinical material and clothing them with certain responsibilities. I must confess that the first reason adduced was the most effective in bringing about this change in our clinical methods for the graduating class. When the proposition was first mooted by our Committee on Internship a certain number of the professors did not appear to be favourably impressed by it, but, fortunately, the urgent need of our hospitals for interns brought about a rather quick conversion of those whose enthusiasm was rather weak, for by 1924 and 1925 the situation as to interns was becoming extremely acute. The Faculty of Medicine had organized a pre-medical year of its own and had imposed it on every student before matriculating, and, on this account, our students generally manifested a strong desire to get into practice immediately after their final examinations. Their M.D. diploma in hand, they were so anxious, after six years of training, to make a living that few of them were desirous of positions as interns. So much was this the case that general hospitals, such as the Nôtre-Dame and the Hôtel-Dieu, which ordinarily required at least ten to fifteen interns could hardly secure four or five. Accordingly, a constant appeal reached the Faculty for a solution of the difficulty.

As a transition measure we had to allow a few of the fifth year students to serve as interns and fill up the ranks. However, this proved to be rather unsatisfactory; the curriculum for the fifth year students was drafted in such a way that these interns were deprived of the opportunity for special training, of which even a general practitioner requires a certain amount. The consequence was that the system presently in vogue of building up the internship from the graduating class came into being.

As a first move we had to clear the way in the fifth year by relegating all clinics, both general and special, to the fourth year. This was accomplished rather easily, after all, and after an experience of six years I may say that this system has proved superior to that previously in operation. The curriculum of the fifth year still includes a few lectures and some practical work, but this is arranged and concentrated in such a way as to leave the intern absolutely free to attend to his hospital duties.

At the time we had six hospitals affiliated with our medical faculty, namely, Hôtel-Dieu (general hospital with 300 beds); Nôtre-Dame (general hospital with 500 beds); Miséricorde (maternity); Ste. Justine (general hospital for children, 300 beds); Sacré-Coeur (tuberculosis and chronic diseases, 700 beds); St. Jean de Dieu (mental and nervous cases, 3,000 beds). The last-mentioned hospital has an infirmary of 600 beds wherein all sorts of clinical cases are under observation and treatment. This infirmary may be regarded as a general hospital. Arrangements were made with these institutions whereby their intern arrangements are managed exclusively by our Faculty. By this plan, whatever may be the number of interns required by the hospitals, every student is assured of a post adjudged to him by the Faculty.

These points being settled, we had to build up a schedule on the basis of a rotating service, the application of which would give each student intern a sufficient amount of clinical medicine, clinical surgery, and the specialties. Every student is entitled to four months in medicine, four months in surgery, and four months divided between two specialties. When making the distribution we regard the different hospitals as a unit that gives opportunities for so many medical departments, so many surgical, and so many special. Each of these departments has its own rating and we realize that they are not all equally valuable to the student. It is accepted between the students that the best goes to the best man; the man with the better record is assured of the more valuable service. At the same time, we aim at giving them all a well-balanced distribution of work. At the end of each term interns are often moved from one hospital to another, for the reason that certain of the hospitals have no equivalence between medicine and surgery, which fact prevents rotation of services within such institutions. This seemed at first to involve a certain inconvenience, and the hospitals did not take kindly to the practice. The experiment, however, proved successful, and the practice in operation has now been accepted as a reasonable one.

As indicated above, our affiliated hospitals have a certain number of graduate interns. These are accepted for special purposes, and, as a rule, they are looking for special training. They

*Preceding articles on medical education can be found in the *Journal*, 1933, **28**: 78, 317, 429, 548 and 662.

are allotted to clinicians under whose direction they are supposed to work the year long. The choice of these interns is left entirely with the hospital concerned. Some of these men spend as much as two or even three years as interns after their graduation. They are a real asset, not only for the hospitals but for the Faculty as a source of future recruits. At the same time they constitute excellent trainers for the younger generation.

As I said before, the principal idea for constituting an internship for students was at first the necessity of providing the hospitals with adequate personnel. This situation made it very easy for us to approach our affiliated institutions and obtained for our Faculty the privileges I have mentioned. I may add that some of us, of the Faculty, saw beyond this necessity. We entertained great hopes that the system would prove a real success, and would bring to our students a large amount of practical knowledge, which would, otherwise, only have come to them after years of private practice. Our dreams have been fully realized. At the present time none among us would think of doing away with this type of internship. The students themselves highly appreciate the benefits derived from it. In my own opinion, the plan has revived the advantages of the old apprenticeship system, with which some of my own generation had a slight acquaintance when beginning the study of medicine. Apprenticeship at that time, say about forty years ago, was thought to be a very good thing. Even with all its weaknesses, as a matter of fact it provided the student with many opportunities to come into more direct touch with the patient. At that time clinics in hospital were rather meagre, consisting usually of lectures from a professor, with a far-distant patient. On the other hand, the apprentice was living in the shadow of his master, and if by chance this latter was a good practitioner his daily practice came under the eye of the student. The same benefit, though in much greater measure, is the lot of our student-intern.

Of course, it may not be possible to apply the system I have outlined to every medical faculty. For us, at least, the local conditions have been hitherto extremely favourable. In the case of some faculties that I know the large number of students graduating might prove an absolute bar to the system. In such a case, I would suggest that a choice be made of the best persons available to fill the posts that are offered, and those remaining be required to follow clinics on a special curriculum. This would be a form of competition reminding us of the French system, whereby a number of students each year are drafted as interns on the basis of drastic tests. Will this method become a necessity for us? I do not think so, at least not in the near future. Our affiliated hospitals are all the time increasing their capacity and, consequently, their need for a greater number of interns.

I have thought it well to describe the system adopted in the University of Montreal to deal with the matter of medical internship, in the hope that our experience may prove useful to others.

Men and Books

DR. THOMAS CHISHOLM, M.P.

(1842-1931)

BY F. ARNOLD CLARKSON, M.B., F.R.C.P. (C.)

Toronto

The biography of the Ontario physicians of the early and middle nineteenth century has been undertaken by many able pens, but the record of the lives of those who have but recently passed off the stage is very meagre. Nevertheless, they lived in a most important epoch of our history, a generation once removed from the pioneer who had partially cleared the farms upon which the great majority of the doctors of that day were born. The farmers of the last half of the century were busy extending the arable land and fencing it in, building roads and schoolhouses, and, to use a military term, consolidating the positions won by their fathers. By the last decade, most of the original log-houses had disappeared, and in lower Ontario at least, labour-laving machinery was beginning to bring more seisure.

The country doctor of this period played an important part in community life, and was perhaps more than at any other time the family counsellor and valued friend. He himself was undergoing a metamorphosis that he wot not of. Bleeding was no longer used as a cure-all, and the seton and the leech were rapidly becoming obsolete. Many of the older physicians were forgetting the Presbyterian anathemas hurled against Sir James Y. Simpson, and were using chloroform in obstetrics. Still later, antisepsis and bacteriology were adopted, but it must be confessed, sometimes with many mental reservations. In the last quarter of the century the doctors of Ontario made a great stride forward in their professional skill, adopting and putting into practice all the advances of that golden age.

It is for the purpose of paying just tribute to this noble band that I wish to sketch the life of Dr. Thomas Chisholm, a worthy type of those physicians who made life more bearable for the men and women who toiled long hours to wrest from the soil a meagre livelihood.

The two events common to every member of the human race need only dates for the purpose of record. Thomas Chisholm was born on the

12th of April, 1842, and died on October 1st, 1931, in his ninetieth year. His father, John, from Galashields, was at the time of his son's birth living on a farm in the Scotch block, in the township of Esquesing, Halton County. When Thomas was about six years old, his Irish mother, Jane McClure, died. A few years later, the little boy fell heir to a stepmother. At twelve we find him living with his uncle, William Chisholm, and a year later he is "working out" with farmers in Wellington County, his school days over. They never had been, all told, more than six months; so that those eugenists who believe in environment only would have difficulty in explaining the thirst for knowledge that possessed this lad, and caused him, more than once, to walk twenty-five miles to have the school inspector "do" a question in arithmetic. Books of all kinds were scarce, but were obtainable at long intervals from the Mechanics' Institutes of neighbouring towns, and the few which fell into Chisholm's hands were eagerly devoured. Darwin's theory of evolution had put new life into biology, but had also fanned into flame the antipathy between science and the church. The controversy became so bitter and so prolonged that it seemed it would be brought to an end only when the last biologist was strangled with the intestines of the last bishop. Young Chisholm, brought up on oatmeal and the Shorter Catechism, was deeply interested in the new doctrine, and it was probably his reading of scientific literature at this time which shaped his thoughts toward the study of medicine. His study in the evenings, after a full day's work of the hardest kind, was rewarded at last by a third-class teacher's certificate.

But the joy of accomplishment was about all he gained, for the Russian war, with its $2.50 wheat was over, and the *post bellum* depression, which seems to be inevitable, had the country in its grip. Just as in recent years the farmers have had to bear the brunt of it, so, in the late fifties, the price of their produce sank almost to the vanishing point, while the manufactured articles which they required were very costly. Tea, for example, was a dollar a pound and sugar ten cents, while their dressed mutton was worth only four cents. The young pedagogue obtained a neighbouring school at the princely salary of $80.00 for six months, and board himself! And at the end of the term even that sinecure disappeared, because this school, as well as many others, was closed for lack of funds. But our indomitable friend soon found another job, not so congenial, perhaps, but one which served as a pot-boiler. He contracted with a farmer to split rails in a swamp, carry them on his back to the road and there pile them, and wait for one year before receiving his pay for twenty-five cents a hundred. The outlook we have upon present conditions is changed very considerably when we study the history of our own neighbourhood.

The long evenings at his books, beside the tallow candle, which he often made himself, brought him at last before the examining board at Guelph and he received a permanent second-class teacher's certificate. He was appointed at once to a country school in Garafraxa, but he had such abounding energy that he rented a farm near by and worked it after hours, a procedure not uncommon in that day in rural school sections. Here he met and married Margaret Gerrie, who was spared to him almost to the end of his long life, to share, with her cheerful optimism, his successes and his failures. After some years in this dual occupation of teacher and farmer he secured a first-class certificate, and became principal of the Douglas Public School, at that time renowned throughout the district for the rowdyism of the "four Willies", who had driven out the previous teacher. Chisholm had not been long in charge before they began their old pranks by locking him in the school. The new dominie, however, made his way out through a window, followed Willie, the minister's son, to the doorstep of the manse and there gave him a sound trouncing. After this episode there was no more trouble with discipline.

A few years later he was promoted to the Fergus High School, but his health failed him after a time, and he was advised to give up teaching. Although he now had two sons and was thirty-four years of age, such was his courage and ambition that he boldly decided to become a physician. Three years later, in 1879, he graduated from the Toronto School of Medicine.

At the Council examination that spring, one of the examiners brought upon himself a great deal of criticism for his unfair method of questioning the Toronto candidates. The subject was surgical anatomy and the catch question had to do with the course of the obturator artery. If the answer was wrong, there was an end of it and the student was ploughed. If, however, the answer was correct, the examiner in a loud and threatening voice said, "Are you perfectly sure?" The slightest hesitation gave the examiner the opportunity to say, "If you don't know the course of such an important artery, it would not be safe to allow you to practise." When Chisholm's turn came, the Toronto members of the Board were growing tired of this unfair browbeating by their little and unpopular colleague. The candidate answered the first question clearly and correctly, and then heard the second "Are you sure?" Happening to glance at one of his professors, he saw that gentleman slowly nod his head, and thus supported, Chisholm replied in the affirmative.

But his troubles were not over. When the Board met that night to consider the results, it was rumoured that nearly all of the Toronto men were plucked in surgical anatomy, and a crowd of noisy and angry students surrounded the medical council building. The particular object of their dislike was sitting with his back to a window; one of the young gentlemen, who afterwards became president of the Canadian Medical Association, was lifted up to a position where he

perpetrated a gross indignity upon the unpopular examiner. It was now the turn of the Board to be angry. Each student was brought next day before them and questioned as to the name of the culprit, but no one, of course, would tell. When Chisholm's turn came, the outraged examiner was at a white heat and threatened to take away his certificate if he refused to answer. The quiet smile of the friendly professor at the other side of the table gave Chisholm courage to reply with some heat that he came from a community where he was respected, and he defied the irate doctor to carry out his threat. And when the results appeared, "Behold, his name led all the rest."

And now began the third and most productive part of his life. With the reputation of an excellent high school teacher in Fergus, he selected that town in which to begin practice and he formed a partnership with Dr. Abraham Groves, who is still there in active work. Later he opened an office in Arthur, and in 1884 moved to a nearby village which was then called Luther. He purchased a farm through which the new railway was to run, surveyed fifty acres into lots, which he auctioned off in one day, and then changed the name of the place to Grand Valley. Some months later we find him in Wingham, which was to be the site of his activities in medical practice, "till that serene which men call age".

There was little romance in the life of any country doctor, plenty of hard work and broken sleep, long tedious drives in swaying buggy or bumping cutter over roads sometimes almost impassable. In one stretch of seven miles, when the doctor himself had a renal calculus, he counted over four hundred pitch-holes. On another occasion he drove in his cutter, in one day, one hundred miles, over roads almost as bad. But this was so common in Ontario in the last quarter of the Victorian era that it is scarcely worthy of mention in a biography. Dr. Chisholm's daily round was that of almost every other practitioner of the time.

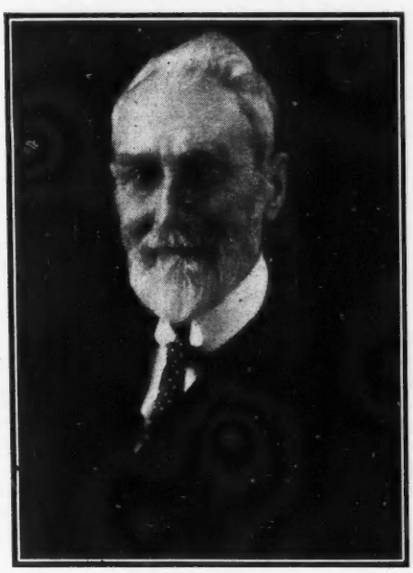
But with the monotonous hoof beats of old "George" and the groaning flesh in the sick room, there was a little leaven of humour, which made the physician's life tolerable. A farmer, born in Yorkshire, and famous at once for his loud voice in prayer and for his ability to use his fists, had a hired man who suffered from a mysterious type of convulsions, which had developed rather suddenly just when the spring plowing demanded his attention. Dr. Chisholm visited him several times, but the attacks always ceased shortly before his arrival. Inquiring closely, he learned that the patient was receiving about twenty dollars a week in sick benefits from various fraternal societies, a sum many times larger than was paid to the school teacher of that day. When the doctor was called again he resolved to get to the bottom of things. The patient, who had passed from one attack to another for most of the day, became suddenly conscious, as usual, when the physician arrived. After a short examination, Chisholm bade them all farewell and ostensibly left for home. He, however, put his horse in charge of a boy, with directions to drive down the lane, past the window where lay the sick man. Scarcely had the rattle of the buggy died away before one of the household came quietly to the doctor, secreted in the parlor, with the information that the patient had another fit. From an adjoining room, Chisholm watched the fellow frothing at the mouth and placing well-directed kicks at any one coming near the bed. Rushing into the sick room, the doctor attempted to administer chloroform, but the "unconscious" patient always managed to push the mask away till Chisholm "brought him to" with a sounding smack on his face Immediately the patient jumped to his feet to strike back at his assailant, but was met by the farmer, standing at guard and daring him to lay a finger on "my doctor Chisholm". Before leaving, the physician recommended, in case of another attack, a remedy not mentioned in the pharmacopœa called "apple bud", meaning a switch cut from an apple tree, a prescription which the farmer filled at once.

There is an old proverb that if you scratch a Russian you will find a Tartar. It is quite certain that underneath the veneer of Canadian civilization there is a large element of barbaric superstition which shows itself in charms, amulets and incantations. Perhaps the desire for the magical is the secret of success in the toe-pullers and the vertebra pushers. In rural communities some of the cruder varieties of primitive therapeutics were sometimes in evidence. Late one evening, when he was practising in Arthur, Dr. Chisholm hurried to an urgent call ten miles away. As he turned into the lane he met an old Irish woman who played the part of nurse in the neighbourhood. "Good avenin'," quoth she, "I thought I'd be tellin' ye that Mr. Brown has bronkittis in the side of his face. His neighbour, Mr. Nolan, had it a few weeks ago and I rubbed it with fastin' spittle. Here I've been rubbin' this since yesterday mornin' and not a bit of food has crossed my gob for fear of spoilin' the charm, and he's no better at all. Sure I don't understand things in this country. Now in Ireland they talk of 'diseases', but everythin' here is an 'algie', and they say this man has newalgie. It's a skilly man ye are, doctor, and maybe ye can explain it to me." The "bronkittis" in the face was a severe erysipelas.

If contemplation was considered good for the soul, the country doctor had plenty of it. In the humble farmsteads he learned to form a just appreciation of life's poignant pathos and of the stark elementals of existence. On the tedious journey home after an anxious but futile vigil, he had time to realize how puny is any mortal strength against the might of Azrael. It is small wonder then that, so close to life and death, some of the deepest philosophers have come from the ranks of medicine. His brother practitioner in the city, who sometimes thought himself more

fortunate, had often an ill-disguised commiseration for those who travelled the back concessions and were caught in the Scylla of provincialism. But the urban colleague was so cast in the monotonously whirling Charybdis of standardization, specialisms, clinics and mechanized civilization, that he overlooked in the rural brother the hidden wells of deep content and shaded paths of tranquil ease.

Much might be written of the difficulties of practice in Ontario during the last three decades of the century. This was the period when the laity had great faith in sealed windows from October to May; when chest protectors and woollen petticoats were considered absolutely necessary to health, and when salt pork was served every day throughout the winter. In



Thomas Chisholm

the parlors of that generation, used only on great occasions, such as weddings, funerals and ministerial visitations, the feminine household waged eternal warfare against the wanton sunbeams that crept through the cracks of the slatted shutters and threatened the pink roses on the rag mats. The boys as they grew up, sought the neighbouring town or more distant city as an outlet for their energies, driven from the farm very largely by the endless chores from which there was no respite. For the girls on the other hand, the only escape was matrimony, because no avenues of endeavour were open to women except school-teaching.

Patent medicines of various degrees of worthlessness were in every house. Popular credulity demanded in that day, and long after, that a doctor's bottle should be large, and the contents unpleasant to the palate if it were to have any therapeutic value. And it was still the day when a father's word was law. Under this beneficent but stern patriarchial rule there was no such thing as a house divided against itself in the medical way, with one doctor for mother, one for each sister, and still another for the baby, besides specialists of all descriptions. Perhaps this should not, from the medical standpoint, be listed as a difficulty.

The long distances he had to travel left the average country doctor little leisure, but such as Chisholm had he devoted to politics. When once he had resolved to enter Parliament, he went about it in his characteristic, vigorous manner, making friends in all walks of life, and paving the way for the contest when it should come. In 1904 he was elected by a handsome majority to represent East Huron in the Federal House, and four years later he was again returned. When the famous question of reciprocity with the United States came up in 1911, he retired from public life, partly because of his years, and partly because he could not go back to an agricultural electorate and persuade them that wider markets for their farm products were bad for them. He was too much of an independent thinker to relish the crack of the party whip. During this political phase of hs life, he developed into a forceful and pleasing speaker. His speech in the House on Imperial Unity was of a high order, and ended with a poem he himself composed. On the hustings the Irish blood from his mother's side made him so quick at repartee that he was seldom in trouble from interruption. Although elected as a Conservative, he retained the independence of thought that was so characteristic of his medical practice.

The evening of his life was longer and happier than that of the average work-a-day physician, and he had time for travel and study. The fatalism of his Calvinistic ancestors, tempered with a grim humorous cynicism, had much to do to bring him to the four score and ten, "with his eye undimmed and his vigour unabated." But at last the dust atoms that ninety years ago had been exalted to make a man, clamored for their humble re-habitation, and on October 1st, 1931, his name disappeared from the Book of Life.

To properly appraise his work is difficult for one so near him in time. In an age of polypharmacy he gave few drugs, and *mirabile dictu*, he used few proprietaries. There were no hospitals in his district and no trained nurses, so he did only minor surgery. But he had learned to use some drugs well and therefore had more than a local reputation in certain diseases. Best of all, he held with Plato's Charmides that the soul should be treated before the body. So he sent his patient away to lie down on his back in green pastures beside the still waters, there to watch the peewee build his nest, to see the trillium unfold its petals, to hearken to the plaintive requiem of the whip-poor-will, to make the brooks run wine and the winds whisper music. Ever the apostle of hope, he held that a physician could cure sometimes, alleviate often, but must comfort always. And so as he moved about among his patients, his quiet, cheery words often wrought more good than his medicine.

In personal appearance, Dr. Chisholm was of medium height, with brown hair and beard,

which became white only in extreme old age. His step was elastic and his movements rapid. His face, bronzed with years of exposure to the weather, was genial, as if the sunshine that had so long beaten on it had not been all used up in painting his skin, but some of it had filtered through the epidermis into the heart to make his existence pleasant and sweet. His address was always frank and pleasing, so that he made friends easily, an important consideration in his political life. Although quick to make decisions, he refrained from leaping into the cathedral chair of dogmatism, or from erecting his prejudices into principles. In his contact with those who had been unfortunate he richly earned the greatest of tributes, "He was a kindly man." The epitaph of John Locke, also philosopher and physician, was applicable to Chisholm, "If you ask what sort of a man he was, the answer is that he was contented with his modest lot."

Provincial Association Notes

Ontario Medical Association
The Hamilton Meeting

The fifty-third annual meeting of the Ontario Medical Association is now history, and, viewed from every angle, it was an excellent meeting. To begin with, our host society, The Hamilton Academy of Medicine, handled the meeting perfectly. Arrangements in every detail worked out as intended. Each man knew his task and did it. Our President, Dr. Holbrook, is to be congratulated upon having such an excellent committee leader as Dr. Don. Warren. To every member of the Committee, sincere thanks are due. To Mrs. Holbrook, Mrs. Warren and the ladies associated with them, we owe a deep debt of gratitude for the splendid entertainment arranged for the ladies, of whom two hundred registered.

Tuesday was business day. The Board of Directors met in the morning to prepare for the business of the week. In the afternoon, the Committee on General Purposes, which is the Parliament of the Association, met with eighty representatives present from every part of the province.

The Teaching of Physiotherapy in the Universities

A resolution was passed, with instructions that it be forwarded to each of the medical schools of the Province, expressing the opinion of the Committee on General Purposes that graduates of our medical colleges should be trained in every form of treatment which has, after thorough investigation and trial, proven to be of value in the treatment of disease. The opinion was expressed that, if so equipped, the medical practitioners in this province would be placed in a much more advantageous position as regards the encroachments of those attempting to cure the sick but who are not registered under the medical act.

Re Sterilization of Mental Defectives

The following resolution was passed by the Committee on General Purposes, as recommended in the Report of the Committee on Mental Hygiene:—

"Whereas mentally defective persons are increasing out of proportion to the rest of the population; and,

Whereas the sanctity of the home demands protection from the dangers inherent in the unrestricted reproduction of mentally defective persons; and,

Whereas the operation of vasectomy in men and the operation of salpingectomy in women destroys the power of reproducing life without removing any of the body organs and without altering any of the functions of the body;

Therefore, be it resolved that the Ontario Medical Association approve of the principle of controlling the propagation of mentally and physically defective persons by the voluntary sterilization of those individuals who may be expected to reproduce such defectives; and be it resolved that the Ontario Medical Association urge the provincial government to enact legislation providing for the voluntary sterilization of inmates of provincial institutions who are about to be discharged and who have been recommended for sterilization by a properly constituted Board; and this Association also urges the provincial government to provide legislation for the legalization of the voluntary sterilization of mentally defective persons who may submit themselves and request to be sterilized, and who are not inmates of provincial institutions; and that a copy of this resolution be sent to the Honourable George Henry, Premier of Ontario, the Honourable J. M. Robb, M.D., Minister of Health, the Honourable W. G. Martin, Minister of Public Welfare, and the Honourable Wm. Price, Attorney General."

The Study of Degenerative Diseases

A committee was appointed by the Board of Directors to investigate and report upon the apparent increase in the so-called degenerative diseases, and to seek ways and means for their alleviation or prevention.

Periodic Health Examinations

The Committee on General Purposes urged that steps be taken to have a larger percentage of periodic health examinations carried out by the family physician, and a special committee was appointed by the Board of Directors to study this matter and report back.

The Hospital Care of Indigents

Correspondence from Northern Ontario called attention to the fact that indigents, as soon as they enter a hospital, are entitled to free medical treatment, and the authorities are excused from making any medical payment on account of relief. As the area in question is unorganized, the doctors there feel that some consideration should be given them in connection with these relief cases. It was decided that this matter should be taken up with the Honourable Minister of Health in the hope that some adjustment might be made.

DISTRICT MEETINGS

The following dates were agreed upon for the respective District Meetings (Note the place and date applicable to you, and plan to attend):—

District Number	1	—Windsor, Wednesday, Oct. 4th
"	2	—Guelph, Wednesday, Sept. 27th
"	3	—Durham, Tuesday, Sept. 26th
"	4	—St. Catharines, Wednesday, Oct. 25th
"	5A	—Newmarket, Tuesday, Oct. 10th
"	5B	—Toronto (Winter date to be set.)
"	6	—Cobourg, Thursday, Sept. 28th
"	7	—Kingston, Wednesday, Oct. 11th
"	8	—Ottawa, Thursday, Oct. 12th
"	9	—North Bay, Monday, Sept. 4th
"	10	—Fort William, Wednesday, Sept. 6th

The Round Table Dinner on Tuesday evening was attended by 140 doctors. The topic for discussion was Medical Services. Many members took part and the Committee on Inter-Relations under the Chairmanship of Dr. A. J. McGanity, entertained no doubts as to the widespread interest being manifested in the Committee's report. At the conclusion of the discussion, the following resolution was adopted to be forwarded to the Government of the Province of Ontario:—

"That the following recommendations of the Committee on Inter-Relations be sent on to the Committee on General Purposes; that this Round Table Conference express its approval of the principle of these resolutions, and recommend that they be sent to the Honourable Prime Minister and the Honourable Minister of Health:—

1. Removal from municipal control and municipal politics of the medical care of indigents.
2. Appointment of a commission similar to the Workmen's Compensation Board or the present Relief Commission, who will handle the problem for the Province.
3. Uniform arrangement between this Commission and the Ontario Medical Association and its affiliated Societies, as to the tariff for medical services to be provided.
4. Services to be authorized by the local Relief Officer, payment to be made direct to the doctor by the Provincial Commission.
5. That there be free choice of doctor by patient.
6. That these new regulations apply to the care of indigents in homes or offices of doctors.

This resolution was later endorsed by the Board of Directors.

Thoughtful members of the profession will recognize in the foregoing that organized medicine in Ontario is endeavouring to give intelligent leadership to the profession in respect to our relations to the public whom we serve. To put our own house in order, to control our destiny (professionally) is much more to be desired than finding ourselves enmeshed in any scheme of state medicine precipitated upon us by any political group. Human nature does not change, but human approach to problems does change. We must not lag behind public opinion. It is much better to direct that opinion if it is possible so to do.

The three luncheons, Wednesday, Thursday and Friday, deserve special mention because they proved to be popular features of the convention. On Wednesday, Chancellor Whidden of McMaster University, gave a very scholarly address, contrasting medicine then and now, as he himself had viewed it. He referred to the marvellous progress which medicine has made, and expressed the hope that progress would continue. On Thursday, President Fox, of the University of Western Ontario, held the interest of his audience by a most timely address on "Medicine, and Something Plus," emphasizing the *plusses*,—the humanity, the culture, the broad education and outlook which an all-round practitioner should possess. On Friday, Principal Fyfe, of Queen's University, gave us a thought-provoking address on medical education, and, with his facile use of the English language, coupled with a subtle sense of humour which bubbles over in such a refreshing manner, he not only interested but greatly entertained his hearers.

The Association desires to express its sincere thanks to the heads of McMaster, Western and Queen's for coming to us and addressing us as they each one so admirably did.

The Annual Dinner Dance held on Wednesday night was an outstanding success. Close upon 400 attended. We were honoured by having as our special guests His Honour, the Lieutenant-Governor, Dr. Herbert A. Bruce, and Mrs. Bruce. A very pleasing feature of the evening was the presentation by the Association, to Dr. Bruce, one of our Past Presidents, of a beautifully illuminated address.

On Thursday afternoon, Dr. and Mrs. Holbrook received at a most charming Garden Party given at the Sanatorium Grounds by the Directors of the Sanatorium. Close upon 1,000 attended, and everyone was delighted with the party. The programme of Thursday night was both unique and interesting. A symposium on economics was presented by Prof. Gilbert Jackson, University of Toronto, Prof. Humphrey Michell, McMaster University, and W. H. Moore, M.P., Oshawa. What they told us would require a special Bulletin to report, but we are hopeful of the future and trust that we are not all going to "lose our shirts," as predicted by Mr. Moore,—or at least, not until we have had an opportunity to replace them.

There is much to be said in favour of all meetings being held under one roof, and we would be remiss in this report if we failed to mention the splendid facilities accorded us in the Royal Connaught Hotel and the unfailing courtesy of its staff.

The officers elected for the coming year are as follows:—

President	Dr. F. C. Neal, Peterborough
First Vice-President	Dr. A. J. McGanity, Kitchener
Second Vice-President	Dr. J. C. Gillie, Fort William
Honorary-Treasurer	Dr. G. Stewart Cameron, Peterborough
Secretary	Dr. T. C. Routley, 184 College St., Toronto

DISTRICT COUNSELLORS

District Number	1	—Dr. A. C. H. Trottier, Windsor
"	2	—Dr. F. J. Burrows, Seaforth
"	3	—Dr. T. H. Sneath, Durham
"	4	—Dr. W. K. Colbeck, Welland
"	5A	—Dr. John Graham, Bolton
"	5B	—Dr. A. J. Mackenzie, Toronto
"	6	—Dr. Geo. Stobie, Belleville
"	7	—Dr. W. A. Jones, Kingston
"	8	—Dr. R. K. Paterson, Ottawa
"	9	—Dr. A. H. McMurchy, North Bay
"	10	—Dr. Chas. Powell, Port Arthur

The annual meeting in 1934 will be held in the Royal York Hotel, Toronto, on May 29th, 30th, 31st, and June 1st.

Medical Societies

Edmonton Academy of Medicine

The April meeting of the Academy was held April 5th in the Medical Building of the University, the President, Dr. Orr, in the chair. As a preliminary Dr. Heber Jamieson continued his review of the Medical History of Edmonton bringing it up to the beginning of the 20th century.

Scientific program. — The speaker for the evening was Dr. D. S. Macnab, of Calgary, his subject being "The practical application of recent advances of our knowledge of the biliary system." In a series of 1,000 autopsies, the biliary system was found to be affected in 59 per cent; stones were found in 32.5 per cent and disease of the gall-bladder in 43 per cent. Stones were found in the bile duct in 43 per cent and 60 per cent of these were near the ampulla.

After discussing the physiology and lymphatic relations of the liver and gall-bladder, Dr. Macnab reviewed the various laboratory tests of biliary function, including the Van den Bergh, icterus index, dye test, biliary excretion test, and the blood excretion, referring also to the x-ray findings in the presence of disease of the gall-bladder. He stressed the point that these tests should not be depended on too much, the important thing in the diagnosis of biliary disease being the history. To establish the diagnosis, following the history and the examination of the patient, the laboratory findings and the persistency of the symptoms should be carefully gone into. Special points in diagnosis to be noted are as follows: (1) an attack of gall stones leaves residual tenderness; (2) the history of jaundice is not important when it is the only symptom; (3) colon disorders must be differentiated from hepatic; (4) Coagulation time of jaundice cases should be carefully noted; (5) when over 50 years of age renal function tests should be done; (6) ulcer of the stomach must be carefully excluded; (7) normal x-ray plates may be disregarded if sufficient clinical findings are present.

Common bile duct stones are frequently found. They are most likely to be found on opening the common duct, and exploration for them is not specially dangerous. They may not be felt in casual examination and jaundice may be absent. An apparently normal gall-bladder should be removed. Liver death results in shock, high temperature, and urinary retention due to cholæmia.

Post-operative care.—Forty-eight hours pre-operative care should be given and it is necessary that plenty of glucose solution be given for the hepatic cells. Post-operatively calcium chloride is essential. Following operation proper diet and proper elimination are necessary.

Dr. Macnab discussed the relationship of gall-bladder disease and heart disease, emphasizing the fact that it may be a focus of disease in arthritic cases. In concluding he stressed the point that success depended upon the definite diagnostic criteria outlined and consideration of the close relationship of all parts of the biliary tract, also the importance of differentiating functional disturbances of the colon, the desirability of performing only one operation, the fact that common duct stones are frequently found and the importance of pre-operative care and careful medical after-treatment.

Dr. Mooney discussed the paper from the radiological standpoint and mentioned the use of chlorium dioxide intravenously for the diagnosis of secondary carcinoma cyst or other intra-hepatic growth. Dr. John Scott dealt with the medical aspect, referring to the use of hexamine as a bacteriological agent, the use of a low protein diet and dealt with the benefits to be derived from biliary drainage. Dr. Gordon Gray reviewed the results of operation on the biliary system and Dr. Blezard the various aspects of anæsthesia in biliary surgery. In closing the discussion Dr. Macnab stated that Walter's preparation was used pre-operatively for those cases where from 250 to 400 grm. per day of carbohydrate was administered and found best. Pre-operatively, he occasionally used transfusion. He thought that in acute cases only, as in empyema and gangrene of the gall-bladder, was there any necessity to hasten operation, and that biliary drainage could be limited to the neurotic, the aged, and in obstructive cases to determine the type of jaundice. As regards anæsthesia he stated that he used gas and oxygen with ether or novocaine.

"My son, in thy sickness be not negligent; but pray unto the Lord, and he shall heal thee. Put away wrong doing, and order thy hands aright, and cleanse thy heart from all manner of sin . . . Then *give place to the physician,* for verily the Lord hath created him; and let him not go from thee, for thou hast need of him. There is a time when in their very hands is the issue for good. For they also shall beseech the Lord, that he may prosper them in giving relief and in healing for the maintenance of life. He that sinneth before his Maker, let him fall into the hands of the physician."—*Ecclesiasticus.*

University Notes

Dalhousie University

Dr. C. A. DeWitt, of Wolfville, paid a visit to Dalhousie University recently to give an address to the student body on the Health Service as carried out at Acadia. This service has been in existence for thirteen years. The lecturer pointed out that attention was paid very largely to preventive medicine, and he also gave details of the full-time medical and nursing services and hospital accommodation. Dr. N. H. Gosse continued the series and gave two lectures on the importance of health service to the student-body.

A Committee consisting of members from each Faculty was appointed recently by the University Senate to map out plans in connection with the Student Health Service and to report to the Senate next year for approval of the scheme.

By arrangement with the City Board of Halifax, students pay visits of inspection to the city water supply, local dairies, restaurants, and food depots. They also visit the outskirts of the city to view shacks and local sanitation, upon which they make reports.

The death of Dr. E. V. Hogan removes one of the best known figures in university circles. Reference has been made to his death elsewhere in this *Journal*. N. B. DREYER

University of Manitoba

At the annual meeting of convocation of the University of Manitoba on May 17th forty-two students received the degree of Doctor of Medicine. Dr. F. A. L. Mathewson and Dr. B. M. Unkauf received the degree of Bachelor of Science in Medicine. Dr. Earl Stephenson received the degree of Master of Surgery (Ch.M.); John Roland Macdonald, M.D., was awarded the University gold medal in Medicine; the Manitoba Medical Alumni Association gold medal (for highest standing for the first four years of the course); and the Chown prize in Medicine consisting of gold medal and $50.00; also the Chown prize in Surgery with Dr. E. M. Polec, gold medal and $25.00. Dr. Elaine G. S. Webb received the Dr. Charlotte W. Ross gold medal for highest standing in Obstetrics during the course. Dr. E. M. Polec tied with Dr. J. R. Macdonald for the Chown prize in Surgery and received a gold medal and $25.00. The Prowse prize for clinical research in Medicine (for original investigation in any department of medicine, clinical or laboratory, judged on the basis of scientific quality and validity of results—open to undergraduates and graduates of not more than ten years standing) was awarded to Dr. Harry Medovy, B.A. The prize consists of a bronze medal and $250.00. Dr. Medovy's thesis was "The treatment of diabetes mellitus in children with normal diet."

The Dean and members of the Faculty of Medicine entertained at luncheon in the Fort Garry Hotel on May 16th for the graduating class in Medicine. Dr. Ross Mitchell gave the address, dealing with episodes in the medical history of Western Canada.

Special Correspondence

The Edinburgh Letter

(From our own correspondent)

The Curators of Patronage of the University of Edinburgh have appointed Professor Ivan de Burgh Daly, M.A., M.D., B.Ch., of Birmingham University, to the Chair of Physiology in succession to Sir Edward Sharpey-Schafer, who retires as from September 30th of this year.

The Consultative Council on the Medical and Allied Services to the Department of Health for Scotland has issued a Report on the organization of the Scottish Hospital Services. The report deals, to a large extent, with the results of the passing of the Local Government (Scotland) Act 1929, which conferred certain powers on local authorities regarding the hospital provision in their areas. It emphasizes the importance of the co-ordination of all the hospital services in the five hospital regions of Scotland. The Council recognizes the important place that the voluntary hospitals occupy in the hospital service of the country, and there can be no doubt that there would be keen regret if the voluntary principle were to disappear or be endangered by the passing of the Act of 1929. It is therefore necessary that the voluntary hospitals and the rate-supported hospitals should work in harmonious co-operation. The report lays stress on the fact that there must be one hospital system for the country, and points out the unfortunate results which would follow if these two classes of hospitals were to develop along divergent lines. Now that hospital treatment has been dissociated from the Poor Law, there is no reason why there should be any class or other distinction, between general hospitals whether statutory or voluntary. Generally speaking the voluntary hospitals have no power of recovering costs of maintenance and treatment. On the other hand, the local authorities are empowered to make charges in the hospitals under their control, except in the case of hospitals for the treatment of infectious diseases. The Council therefore recommends that the same conditions should apply in the voluntary as in the local authority hospitals, provided that no charge is made in the case of necessitous pa-

tients. It follows that the two types of hospital should be administered in such a way that the public will have equal confidence in both. This implies that the staffs of both should be of equal professional standing. The principle of contributory schemes in aid of voluntary hospitals and the provision of an almoner system should receive the careful consideration of the hospital authorities in each area. The movement for the payment of the visiting staffs of voluntary hospitals has grown in force in recent years and it seems inevitable that in time this principle will be generally applied. An important recommendation of the Council is that the number of family doctors brought into active association with the hospitals should be increased and that both classes of hospital should be equally available, within the limits of their facilities, for the teaching of medical students and the training of nurses.

The close ties between Canada and Scotland were emphasized at the recent opening of the Canada Exhibition Shop in Edinburgh. The High Commissioner for Canada, Mr. G. Howard Ferguson, Mrs. Ferguson and the Lord Provost of Edinburgh welcomed the large gathering. The shop contains Canadian food products of every description such as fish, fruit, meats, soups, vegetables, cereals, flour, honey, maple products, tobacco, cigarettes and whisky. The exhibits are very attractively displayed. The Lord Provost in opening the Exhibition said there was no part of the map coloured red that was more closely joined to Scotland than Canada was. In Canada more than in any other place outside Scotland itself were to be found Scottish names both of people and places, and there was always a ready welcome for Scottish people in Canada. He hoped that the success of the shop would be the prelude to trade movements on a wider scale between Scotland and Canada. On the same day the Lord Provost met the High Commissioner for Canada at the north-western part of the Esplanade of Edinburgh Castle, where Barons of Nova Scotia were formerly created, and where tradition has it that some Nova Scotian soil was scattered into the ground.

R. W. CRAIG.

Edinburgh.

The London Letter

(From our own correspondent)

At no previous time has there been such an abundance of remedies offered to the profession by the ever-growing multitude of chemical manufactures and purveyors of endocrine and other animal products and while there is no objection to any doctor using injections of "XYZ 58" or whatever the latest product is called it is very important that he should preserve his sense of proportion and judgment before rushing to conclusions about the success obtained or the desirability of employing the same stuff for *all* cases of this or that. This observation is prompted by a study of Lord Horder's address to the Medical Society of London on the occasion of the annual oration when he took for his subject "New treatments for old." This was emphatically a plea for a return to the first principles of therapeutics which are essentially physiological principles. He pointed out what many are inclined to forget that most of our treatments and some that are quite successful are matters of expediency: they are not matters of right or wrong. He went on to say "it is always Nature that cures, and not we." This was followed by a most important criticism of what Lord Horder terms "direct action", which he succinctly described as "the main appeal of the quack medicine to the credulous public." The result is that no longer is treatment planned as a whole in the form of a logical scheme but an injection of some so-called specific is given at once, the doctor goes away and the public get rightly cross that "nothing is being done." If only there was some guiding principle at work there would be little need for the practitioner to feel at a loss at what to prescribe. Lord Horder has performed a valuable service in so forcibly expressing the opinions of many thinking members of the profession. What many of us want—and the speaker himself expressed the need for it—is more time to think.

The hectic rush of modern life is apparent not only in the medical profession—it begins right back in school days. Dr. Reginald Miller recently published a lecture on the medical aspects of boarding school life which was largely a plea for less work and more leisure, with detailed suggestions, ranging from a dunce to teach mathematics, to breakfast in bed for tired pupils! The laughter with which this sort of remark was no doubt greeted in the staff rooms of many of our big schools will unfortunately prevent much of Dr. Miller's valuable survey from reaching the very people who need most to be told that an inattentive, stupid and inaccurate child developing these attributes after a period of normality is suffering in all likelihood from fatigue rather than naughtiness and needs more rest instead of spurring on to fresh efforts. Dr. Miller considers boarding-school provides the least strain of school life, with certain safeguards as to food, rest, etc., and he would like to see better cooperation between parents and schools with better reports and perhaps even a report from the parents to the school about the events of the holidays. When all is said and done he comes back to his main point that fatigue is the commonest and perhaps the least appreciated of the causes of transient or even permanent ill success at school. He thinks the hours of work are far too long and more rest is needed by all children, including some respite from the ever-present noise and rowing which goes on. The teacher must be

able to recognize fatigue as such and see that the tired child gets such slight modifications of the school régime as are necessary to put things right.

Another aspect of the maternal mortality problem is presented in the report recently prepared by the British Medical Association from figures supplied by over 400 practitioners. When the Ministry of Health first appointed a committee to inquire into this problem there was more than a suggestion made in various quarters that the problem was simply one of bad doctoring. The British Medical Association decided that this must be settled at once by a careful study of the work of practitioners and while the present report shows that the keen practitioner can get better results than the average for the country as a whole, the honour of the profession, so to speak, had already been vindicated by the two reports of the Ministry. Where the present report (which unfortunately is not to be published) is of special value is to show that in a selection of private midwifery practice the mortality rates from sepsis and from strictly puerperal causes is considerably less than for the country as a whole, but that even among this relatively successful group of doctors the ante-natal examination carried out was lamentably short of what is regarded as a minimum by the authorities. It is hopeless for the public to complain about the alarmingly high death rates in childbirth and for the lay papers to hint that the medical profession is mainly to blame. The first essential to any improvement must be a campaign to get the public to appreciate that adequate ante-natal supervision is essential, and can only be secured with whole-hearted cooperation by the public itself.

One of the great advantages which the unregistered practitioner has always enjoyed over his registered colleague has been the right to advertise and in this age of advertisement this may mean a very great deal. There have been discussions from time to time as to whether the profession should not counter this by advertising as a whole but there have been difficulties about this. Now it is announced that the public medical service schemes which have come into being in various parts of the country, especially in certain parts of London and outskirts, are to be allowed to advertise. The matter has been considered by the Council of the British Medical Association and is to come up for discussion at the next annual meeting. Meanwhile certain details have been announced which make it clear that the rights of the individual practitioner outside the scheme have been safeguarded. It is very likely that this form of group advertisement will come to stay.

ALAN MONCRIEFF.

London.

Letters, Notes and Queries

Protection of Eyes in Welding

To the Editor:

I have a patient who is an electric welder. He wears the best eye protection that he knows how to obtain, but his eyes are red and painful each night if he is working.

Could you inform me as to the best type of protective goggles, or other equipment, and where it could be obtained? I would also be glad of any references to protection of eyes in Electric Arc Welding.

A. H. TAYLOR.

Goderich, Ontario,
May 8, 1933.

Answer:

Replying to your letter of May 8th, in which you ask to be informed concerning the best type of protective goggles for electric welders, a number of concerns manufacture satisfactory goggles. A few of the American companies are listed here:—

American Optical Company, New York City, N.Y.
Chicago Eye-shield Company, Chicago, Illinois.
Mine Safety Appliances Company, Pittsburgh, Pa.
Willson Products, Inc., Reading, Pa.

Many of these firms have Canadian distributors. If you wish to deal direct with a Canadian firm, you might write to the Safety Supply Company, 1231 St. Catherine St. West, Montreal.

The hazard to the eye from electric welding, apart from the danger of flying particles, is two-fold: (1) from the intense light; (2) from ultra-violet rays. To guard against the first, a coloured lens must be used, and for protection against the second, any ordinary glass will prevent the ultra-violet rays from penetrating. A lens which should be satisfactory for the work of your patient should transmit less than 1 per cent of visible light and about 0.1 per cent of ultra-violet radiation. It is important that no light be permitted to enter the eye from the side, and that the goggles be worn at all times when welding is being done.

FRANK G. PEDLEY, M.D.,
Dept. of Public Health and Preventive Medicine,
McGill University.

May 15, 1933

Medical Licensure in Retrospect

(Some time ago we received a newspaper clipping announcing the death at La Flêche, Sask., of Dr. O. E. Belcourt, the last surviving member of the class of 1879 from Victoria University Medical School, Montreal. A correspondent sent us the clipping with a letter in which he expressed himself with such feeling (and with so much grace) that we felt it should be passed on to our readers. Permission to do so

has been very kindly granted by the author, wh wishes us, however, to withhold his name. ED.)

". . . . Incidentally this news item tells a story which may not appeal to all our fellows as it appeals to me.

It has to do with the many young medical graduates who, in earlier days, left Montreal and Toronto without having secured license to practise in Canada. They went to "the States" for economic reasons alone. I was one of them in the trying days of the nineties. Five of them ventured back to write the license examination before it was too late. I used my last dollar doing this in 1902. Up and down the land wherever I went I met them. Always it was the same story. They were living for the day when they could afford to go back to Toronto, Hamilton, Montreal or the old-world-like charms of Quebec. Often it was some quiet little village of childhood which drew their hearts. Then came the thought of the examination and that made the heart very sick. Note the name of the Red River valley village (Argyle) to which Doctor Belcourt drifted in Minnesota, amidst the none too friendly and heterogeneous people of that region. The very name of the town would draw a young man from Canada. Yet even there, as I know so well, one's heart ached to be rid of the sound of every tongue of central and northern Europe. So came the opening of our own western plains. Long ago we had laid away our loved plan for a little practice in Ontario or Quebec—sadly laid away. Here, however, appeared a chance to work under the flag we loved so well. What joy came of helping to found a new village, of being again a real citizen, of sharing in the profits of our wonderful wheat field. This for but a little while, for one thinks of Omar Khayyam's lines:

> When the draught and rust and grasshoppers have passed
> Like snow upon the Desert's dusty face
> Lighting a little hour—or two—is gone.

But one is still at home and it is easier to be in need here, than under an alien flag.

To this day I receive letters from those men south of 'Forty-nine.' They still ask of the prospect. Never one of them I met but might be welcomed home, knowing he is a good fellow and honourable. If I could, I would have them all admitted to practise among us. All who have Canadian degrees and clean slates. The executive of the licensing bodies will point to the law. There should be rather than law, much unstrained mercy for homesick old boys, and if not, why should we mention the words 'medical fraternity'?"

A Century of Progress Exposition, Chicago

The following invitation has been received from the Chicago Medical Society addressed to members of the Canadian Medical Association:

Dear Sir:

You are doubtless aware of the fact that during the summer of 1933, A Century of Progress Exposition is being held in Chicago.

The Chicago Medical Society has a booth in the Hall of Science Building in Group K. In this booth we will have information for the visiting physicians and will be glad to assist any of the members from your Society in every way possible.

The Woman's Auxiliary to the Chicago Medical Society will welcome the wives and daughters of physicians.

I trust we will have the pleasure of meeting a large number of physicians from Canada and of being of some help to them.

Yours very truly,

Committee A Century of Progress,
WILBER POST
JULIUS HESS
HUGH N. MACKECHNE, *Chairman.*

185 N. Wabash Ave.,
Chicago, Ill.,
June 7, 1933.

Topics of Current Interest

International Vitamin Standards

In June, 1931, a Conference was held in London under the auspices of the Permanent Commission on Biological Standardization of the Health Organization of the League of Nations with the object of considering the possibility of adopting standards and defining units for certain of the vitamins. The Conference recommended the adoption of a standard and defined a unit in terms of such a standard in the case of four vitamins—A, B_1, C and D. The National Institute of Medical Research, Hampstead, London, was nominated to act on behalf of the Health Organization of the League of Nations as a central laboratory for the storage of vitamins A, B_1, and D. In the case of vitamin C no preparation or storage of a stable standard was involved by the recommendation of the Conference, which was satisfied for this vitamin to recommend the use of fresh lemon juice as a standard, and to define the unit as the anti-scorbutic activity of 0.1 cm. of the juice prepared according to a simple method described in the report.

VITAMIN A.

Carotene was recommended as the international standard for vitamin A, and the unit

was defined as the vitamin A activity of 1 x (0.001 mg.) of the standard preparation of carotene. Eight laboratories have contributed varying quantities of carotene, and these have been mixed at the National Institute for Medical Research; the mixed carotene has been purified by recrystallization until the melting point was above 179°C. The highly purified preparation has been distributed in 10 mg. quantities into small ampoules in an atmosphere of pure nitrogen, reduced to dryness, and the ampoules sealed.

VITAMIN D.

With regard to the international standard for vitamin D, the Conference recommended that the standard solution of irradiated ergosterol, which was issued from the National Institute for Medical Research, Hampstead, during the years 1930 and 1931, should be adopted as the international standard. On account of the fact that this standard preparation had been intended, primarily, for the needs of Great Britain alone, it was considered desirable to prepare a larger quantity to meet the needs of other interested countries, nineteen in all, for a period of some years. Accordingly, a second and larger quantity of irradiated ergosterol has been prepared at the National Institute for Medical Research, and this has been assayed in terms of the original standard preparation. The comparative examination of the new and the original standard preparations has been carried out by eight different laboratories in five different countries and these eight groups of workers are unanimous in agreeing that the new standard now available is exactly equivalent to the original standard. There is, accordingly, now available an adequate amount of this standard preparation of vitamin D to meet the requirements of all workers throughout the world for some years to come. The unit recommended for international use is defined as the vitamin D activity of 1 mg. of the international standard solution of irradiated ergosterol.

VITAMIN B_1.

The standard for vitamin B_1 recommended for international adoption is a concentrated preparation of the antineuritic vitamin B_1, adsorbed on kaolin. In accordance with the terms of the Conference this standard has been prepared in the Medical Laboratory, Batavia, Java. The international unit was defined as the antineuritic activity of 10 mg. of the international standard preparation. The standard preparation is very stable, and, provided it is protected from moisture, appears to retain its activity unchanged.

Suitable supplies of each of the above standards have been sent to approved national institutions for local distribution. In the case of this country the institution which is in charge of distribution, and to which those who wish to obtain supplies of one or other of the standards should apply, is the Department of Pensions and National Health, Ottawa.—F. G. Boudreau, Medical Director, page i, Health Section, League of Nations.

Cancer: The Menace of Repeated Examinations

Two dangers, usually though not invariably fatal in their consequences, are a constant threat in the life cycle of a carcinoma: (1) the invasion and permeation of the lymphatics; (2) the invasion of the blood stream. Clinicians in general have long recognized the importance of the permeation of lymphatics by an epithelioma and of the early spread of sarcoma through the blood stream, but less well appreciated is the invasion of the blood vessels by the epithelial and glandular cancers.

As early as 1880, Weigert, by special staining methods, demonstrated microscopically that cancer cells directly invade the walls of blood vessels traversing the tumour. Schmidt later amplified these studies and presented fifteen instances in which he found emboli of the cancer cell in the small pulmonary arteries without macroscopic evidence of involvement of the lung. The primary carcinoma in these cases occurred in the prostate, uterus, ovary, bladder, rectum, bile passages, and stomach.

The significance of these two studies, amply confirmed since, is obvious. Invasion of a blood vessel in the cancerous growth with subsequent metastasis to the pulmonary capillaries may be present without clinical evidence. Such metastases may occur at any stage in the life cycle of the cancer, and no one can foretell or know when such a metastatic embolus is released into the blood stream. Perhaps it should be recognized that the treatment of cancer is an emergency measure almost as compelling as appendectomy for acute appendicitis, since it is fraught with even greater danger. A cancer cell, hanging on the brink of a swiftly moving blood stream, may be broken off at any moment and carried beyond reach of effective treatment. Numerous circumstances may hasten this ultimately fatal incident. Massage, the application of heat, iodine, or salves can serve only to increase the hazard of embolic metastases and to nullify completely any later attempts which may be made to control the disease.

Equally dangerous is the manipulation or handling of a malignant tumour by the examining physician. Quite unwittingly he may be party to the dissemination of the cancer by displacing cells into the lumen of an eroded blood vessel. Experimentally, Tyzzer demonstrated the evils of even gentle massage of malignant

tumours grown in mice. Repeated short periods of massage of a total duration of only 3 to 5 minutes resulted in double the number of metastases outside the original tumour. Manifestly, any handling and examination of a cancerous lesion, such as a lump in the breast, must be ever so gentle and brief, and must be carried out *by as few hands as possible.*

The application of this obvious fundamental principle in the care of cancer has been conspicuously disregarded in our medical schools. One need only to follow, for example, a tumour of the breast through the gauntlet of examinations in the out-patient clinic at the hands of students, assistant residents, and visiting surgeons, and through a second gauntlet of careful hospital examinations by student, intern, and members of the house and teaching staff, to realize the possible harm that can be inflicted by repeated examinations before the arrival of the patient in the operating room. Small wonder that recent statistics from a teaching hospital paint such a doleful picture and that only 12.2 per cent of 573 patients lived 10 years or more after the removal of the cancerous breast. On the other hand, comparable statistics from another clinic where comparatively few examinations are made indicate that 13 per cent of those with axillary involvement and 44 per cent of those without axillary involvement lived 10 years or more. The wide discrepancy in results cannot properly be attributed to type of case or type of operation. The reason lies most probably in the trauma which is caused by repeated examinations. Of course, it must be admitted that in any case of cancer of the breast one cannot set aside the probability that the patient herself long before admission to the hospital has been guilty of palpation, compression, and even massage of the tumour, but similar ill-advised manœuvres by examining physicians cannot be too severely criticized.

To safeguard the patient and to avoid being an unwitting party to the dissemination of death dealing cancer it is suggested that teaching hospitals and clinics observe the following rules:—

1. A suspected carcinoma of the breast may be inspected, but not palpated, by student, intern, or assistant resident, except by the flat hand gently applied to the tumour, which must not be squeezed or compressed by the fingers or otherwise handled.

2. Under no circumstances shall the glands in the axillary be felt or sought for except by the operating surgeon, and then only with the gentlest touch.

3. The visiting surgeon or resident in charge shall determine the disposition of the case with the minimum examination possible—with inspection only, whenever the eye can determine the diagnosis.

In any campaign against cancer it is essential that doctors, students and teachers, should recognize the justice of these rules, and that every effort should be made and every means should be employed to determine the diagnosis of accessible tumours without unnecessarily endangering the life of the patient. Moreover, it is obvious that an analysis of the results of different methods of treatment of carcinoma of the breast is incomplete, and the proper evaluation of such methods practically impossible, without a knowledge of what has occurred in the interval between first recognition of trouble by the patient and her submission to medical treatment. The results in patients who submit to treatment after long delays, punctuated by massage and local remedies, cannot be compared to the results obtained in those who are treated promptly after the discovery of the lesion. A segregation of the two classes of patients should increase the accuracy of any statistical studies which may be undertaken to compare different methods of treatment of cancer of the breast.—Abs. from an Edit. by Emile Holman, in *Surg., Gyn. & Obstet.*, Nov., 1932.

Abstracts from Current Literature

Medicine

Nephritic Albuminuria. Hayman, J. M., Jr. and Bender, J. A., *Arch. Int. Med.*, 1933, **51**: 477.

Since the time of Bright albuminuria has been associated with disease of the kidneys. Much has been written recently to distinguish between non-nephritic and nephritic albuminuria. The former has usually been attributed to transient and reversible increased impermeability of the glomerular membrane from partial asphyxiation brought about by circulatory changes. From time to time, however, the suggestion has been made that nephritic albuminuria is the result of changes in the plasma proteins rather than any change in or damage to the kidney itself. Many theories have been advanced, including Epstein's view of a disturbance of plasma-protein formation in so-called "nephrosis," and Kollert's and Starlinger's view of increased tissue destruction leading to increase in fibrinogen. More recently, Andrews, Thomas and Welker conceived of albuminuria as a method of detoxication of the body; due to a disturbance in the ratios of inorganic salts in the body, proteins, which are foreign to the blood stream, are allowed to escape from the tissue cells, and are therefore excreted by the kidney as foreign protein. The authors reasoned that if such were the case, plasma from nephritic patients who were excreting large amounts of protein should, when injected into a normal person, lead to the

appearance of albuminuria. They therefore injected from 50 to 190 c.c. of citrated plasma from three such patients, who had negative Wassermann reactions and no history or evidence of syphilis, into persons of compatible blood groups who had no albuminuria or detectable renal damage. They present briefly the histories of the three cases, but in no case was albuminuria produced. These experiments are regarded as another failure to demonstrate by direct experiment, qualitative changes in the plasma proteins of persons having nephritic albuminuria, and are inconsistent with the conception that nephritic albuminuria is due to the presence of foreign toxic proteins in the blood stream. L. J. ADAMS

Calcium Need and Calcium Utilization. Bernheim, A. R., *J. Am. M. Ass.*, 1933, **100**: 1001.

There is a real deficiency in calcium in the diet of a large number of people, owing to the belief that such things as bread should be one of the chief articles consumed. There should be a larger amount of calcium ingested than has been thought sufficient for health. Otherwise we are enough below what should be our level of resistance and general tone to be more susceptible to disease and even fail to acquire the growth and physique possible to us. Are many of the ailments that carry off people in middle life indirectly due to lack of calcium? Is the depletion of the calcium in bones, usually attributed to old age, really the result of insufficient calcium in the diet? There are three things to consider about this calcium problem: (1) the source; (2) the proper preparation of food to avoid losing calcium content; (3) the absorption.

(1) Many articles supposed to be rich in calcium have such a small content that enormous quantities would have to be eaten, for example seven loaves of bread each day, whereas milk and cheese both contain a very large amount. (2) Vegetables lose their calcium in the water they are boiled in. (3) Absorption depends on (a) the hydrogen-ion concentration, so that foods promoting intestinal acidity are helpful; (b) the type of food in diet-fats interfere by combining with calcium to make insoluble soaps. Too much phosphorus, or oxalic acid, have the same effect. Thus lactose—producing lactic acid—is much better than maltose and the staple starches. Calcium is better absorbed if taken before meals than at meal time. The absorption of calcium varies greatly in different people, following the variations in intestinal alkalinity. The parathyroid glands, vitamin D, blood protein and phosphorus, proper hydrogen-ion concentration are all necessary, making the problem very complex. What we must aim at is a really sufficient supply in the diet. Besides milk and cheese, calcium lactate (80 grs. daily) and calcium gluconate (160 grs. daily) can be used with large amounts of orange juice (6 to 8 ounces) and concentrated cod liver oil to constitute a "high vitamin high calcium diet", which is useful in many conditions, including even duodenal ulcer. People who do not tan lose a very vital means of acquiring vitamin D from sun rays and need to take vitamin D the year round.

Generally speaking attention has been given to the special types of calcium medication and metabolism and not enough to ensuring a sufficient quantity in the diet. P. M. MACDONNELL

The Effect of Tonsillectomy on the Occurrence and Course of Acute Polyarthritis. Finland, M., Robey, W. H. and Heimann, H., *Am. Heart J.*, 1933, **8**: 343.

This study was made to determine if possible whether or not the enucleation of the tonsils at any stage of acute polyarthritis has any effect upon the recurrence of the condition. The case records are of 654 consecutive patients admitted to the Boston City Hospital for study. In the series males predominated approximately, in the proportion of 3 to 2. It is interesting to note that 25 per cent of the cases were over the age of forty. Fifty-one per cent of the cases were admitted for an initial attack and 49 per cent for recurrence. In the whole series 17.4 per cent had previously had their tonsils removed, and about twice the percentage of cases previously subjected to tonsillectomy were admitted for a recurrence as were admitted for an initial attack. The authors conclude that tonsillectomy had no influence upon the individual attack and no influence upon recurrences. W. H. HATFIELD

Is Allergy a Factor in Angina Pectoris and Cardiac Infarct? Werley, G., *M. J. & Rec.*, 1932, **136**: 417.

Several considerations suggested to the author that angina pectoris and coronary infarction have an allergic basis in many cases.

(1) Food, especially excessive eating, has been related to angina pectoris by many writers, and dieting has formed part of the treatment usually suggested for this affection. (2) In animals anaphylaxis produces changes in the arteries and vascular endothelium, and food allergy has been thought (Funk) to cause atherosclerosis. (3) Indiscretions in diet with toxic symptoms, such as coated tongue, foul breath, and sallow colour, frequently precede an attack of angina pectoris or coronary occlusion. (4) Allergy may produce arteriolar spasm.

The author reports 6 cases in detail in which food allergy was associated with anginal pain or cardiac infarction, and in which he obtained positive skin tests to various foods. In these patients, attacks of angina pectoris were diminished by diet based on known food sensitivities, and in one of the cases were precipitated by

again taking the prohibited foods. One other similar case is mentioned briefly. A careful allergic history was taken in 62 cases of angina pectoris and cardiac infarction. A history of migraine was found in 34, of urticaria in 20, of asthma in 11, of hay fever in 7, and of angioneurotic œdema in 7. Eighteen were subjected to skin tests and all reacted. Forty per cent gave allergic family histories. At autopsy, in a case of infarct with thrombosis of the right coronary artery, the author found the gastric mucosa red and swollen. Poisoning was suspected, but no evidence of this was found. The attack began with severe epigastric pain and bilious vomiting with death in 24 hours. There was a history of severe migraine.

The author concludes that food allergy can account for angina pectoris and cardiac infarction.

T. G. HEATON

Surgery

Treatment of Burns and Scalds. Mitchiner, P. H., *Brit. M. J.*, 1933, **1**: 447.

The progress of the treatment of burns and scalds during the past forty years is discussed, with special reference to the records of St. Thomas' Hospital. From 1894-99, when the treatment was "baths and ointment", the combined mortality from burns and scalds was 30.8 per cent; from 1900-1903 (picric acid treatment)—25.8 per cent; 1924-28 (still picric acid)—9.4 per cent; 1928-32 (2 per cent tannic acid)—2.4 per cent. It is noted that instead of the old proportion of 3 burns to 2 scalds, the figure is now reversed—1 to 2.5. This point has had a most beneficial effect on the mortality, irrespective of the treatment used. While improved social conditions have done much to reduce mortality, it is obvious that improved treatment has done more. The most important step has been the introduction or, rather, the rediscovery of tannic acid in this relationship.

Death from burns may be due to initial shock; more important is toxæmia due to the absorption of toxic substances, chiefly histamine, from the damaged tissue (maximal in 6 to 24 hours). This stage is best combated by exsanguination transfusion. The most important factor, responsible for perhaps 80 per cent of the deaths, is the extensive loss of blood serum from the burned surface. This also is greatest 6 to 24 hours after the injury. Experiments in rabbits (Underhill) have shown that 70 per cent of the blood volume may be lost, and death is invariable when as little as 1/6th of the total surface is burned. Fluids may be replaced intravenously, subcutaneously or orally, but the replacement will be inadequate unless some methods are adopted to combat the loss—notably, by coagulation of the burnt surface. Picric acid did coagulate the tissues to some extent, but it did not penetrate the tissues well and was in itself somewhat toxic. Sepsis used to be a great problem in the old days; this factor was negligible with picric acid treatment and is practically non-existent when tannic acid is properly used.

The author first used tannic acid by the spray method and got very good results. Disadvantages were the necessity for leaving the area exposed to the air and the need for hourly sprayings with freshly made solutions. There was also the difficulty of carrying out the method when both front and back of body are involved. To obviate these disadvantages a compress-method has been devised. For first-aid purposes in the home, etc., powders or tablets may be made up containing tannic acid, 17½ grains and perchloride of mercury, ½ grain (plus boric acid 1 grain, in the tablet). These may be dissolved in 2 oz. of warm tap water, when a 2 per cent solution results, from which the first-aid compress is prepared. The hospital practice is to remove such first-aid dressings on admission, and carefully to cleanse the whole burned area with soap and water—applied with sterile swab, finally sponging with ether. Insensibility to pain is first induced by the administration of large doses of opiates (from m.ii or iii, of Tinct. Camph. Co. for a child of 1 month up, to morphine, gr. ½, for an able-bodied man). This is safer than general anæsthesia, which is apt to be followed by pulmonary complications in these cases. After the cleansing, a 6-layer gauze compress soaked in a solution of 2 per cent tannic acid and 1 in 2000 bichloride of mercury is then applied and kept thoroughly wet. It is left in position for a fortnight, unless there is sepsis when it should be removed and the area re-cleaned. Certain areas, such as the perineum, groin, axilla and face are still best treated by the spray method. By using these methods, the mortality of severe burns and scalds has been reduced to 4 per cent and 1.7 per cent respectively.

W. F. CONNELL

Duodenal Tuberculosis. Matthews, W. B. *et al., Arch. Surg.*, 1932, **25**: 1056.

Tuberculosis of the duodenum, either as a part of an advanced tuberculous infection or as an entity in itself and causing symptoms, rarely occurs. The recorded cases between 1863 and the present time are reviewed. The authors report the case-history of a patient, fifty-seven years of age, with hyperplastic tuberculosis of the duodenum. Seven or eight months before entering the hospital he had had a severe "cold". Following this there was loss of appetite, progressive loss of weight and strength and increased epigastric discomfort, such as a sensation of fullness after food and repeated vomiting. Alkalis relieved the discomfort. Examination revealed slight epigastric tenderness, but no palpable tumour. There was occult blood in the stools. Fluoroscopic examination

showed a filling defect in the pyloric antrum without obstruction. Roentgenograms revealed no signs of active pulmonary tuberculosis but a few calcified areas. At operation a smooth firm mass was found in the first portion of the duodenum extending to the pyloric sphincter. Adjacent lymphatic glands were not enlarged and there was no other lesion found in the abdomen. The first portion of the duodenum and the pyloric portion of the stomach were resected and a modified Polya anastomosis performed. An abscess developed near the hilus of the right lung shortly after operation, and the patient succumbed. Microscopical sections of the tumour removed from the duodenum demonstrated a fairly typical tuberculous lesion.

G. E. LEARMONTH

The Full Thickness Skin Graft. Garlock, J. H., *Ann. Surg.*, 1933, **97**: 259.

Success in full-thickness skin-grafting depends largely upon an almost perfect aseptic technique. Thus, such a graft should be placed only on a fresh surgical wound, *e.g.*, following the excision of cicatrices, or of tumours, to furnish skin in the operation for syndactylism, and to replace hair-bearing skin. The back of the neck, the forehead and face, and parts of the torso can be grafted with full-thickness grafts. The greatest field of usefulness is in the extremities, *e.g.*, at the popliteal space and antecubital fossa. A full-thickness graft will not unite to bone or tendon. Future shrinkage, changes in colour, the development of heavy scars at the edges, and the growth of hair must all be considered in doing full-thickness grafting. If the graft takes perfectly, shrinkage is slight. True blondes develop little if any pigmentation in such a graft; brunettes may. The development of a heavy scar cannot be predicted or prevented. As to hair, non-hair-bearing skin should be used for non-hair-bearing areas.

Before applying the graft the bed must be absolutely dry. Triple zero plain catgut, pressure, and warm sponges are used in attaining this. The edges of the wound should be undercut to obtain accurate apposition. The graft is cut exactly to pattern, which the author fashions in stiff paraffin mesh gauze. Its outline is marked out, using a tooth pick and brilliant green. The graft is cut with a very sharp knife. It is handled with fine hooks. Even the slightest trauma is harmful. The under surface should be free of fat and show white and stippled with tiny depressions. Fine horsehair is used to stitch the graft into place. The graft is covered with three or four layers of gauze soaked in 2 or 3 per cent xeroform ointment. More gauze is added, then a large moistened bath sponge, and, lastly, a sterile bandage is firmly applied. Pressure must not be too great, and yet great enough not to allow hæmorrhage beneath the graft. Air should not be excluded entirely. Absolute fixation of the grafted area during the period of healing is necessary. Splinting should be carried out for three weeks.

If all points in the technique have been observed the dressing need not be disturbed for 2 to 2½ weeks. The wound may be dressed with safety in 8 or 9 days. Blebs on the graft are not opened. Infection is treated with boric acid dressings. Protection of the graft from mechanical and thermal injury should be carried out for 6 weeks. Sensation returns from the edges in a centrifugal manner. In small grafts tactile sensation may be noted in 6 weeks.

STUART GORDON

Obstetrics and Gynæcology

The Detection of the Clinically Latent Cancer of the Cervix. Graves, W. P. *Surg., Gyn. & Obst.*, 1933, **56**: 317.

The life history of a cervical cancer covers on an average from 10 to 12 or more years. This includes a long irritative stage of chronic cervicitis and a shorter, though still protracted, period of clinical latency, during which the cancerous change, though actually present, does not attract the attention of the patient or attendant. Under the stimulation of chronic irritation the cancer process starts in a single indifferent cell of the basal layer of the epidermis of the portio vaginalis. The malignant cell at first produces a virus that is capable of inciting malignancy in neighbouring normal cells. This process is called *assimilation*. A cancerous process thus inaugurated never heals spontaneously, but progresses inexorably to the late stage, that of invasion. The cancer now extends by a new force, namely, by the *multiplication* of its own cells which is so irresistible that it invades and destroys the neighbouring tissues. The histological picture of an early cancer in the assimilation stage shows an abrupt demarcation between the normal epidermis and the cancer, which always appears as an oblique line, and also anaplastic atypia and polymorphia of the abnormal cells.

Schiller devised a test to discover the location of the cancerous process not distinguishable by eye or touch. In the normal living tissue the glycogen of the upper layers of cells is stained in a few seconds a deep mahogany brown by Lugol's solution. A superficial area of early cancer being devoid of glycogen does not receive the stain and stands out startlingly white or pink against the deeply coloured, almost black, background of the normal tissue. Graves finds the Schiller test an indispensable aid in the search for early curable cancer of the cervix. It is specific in the absence of cancer, *i.e.*, when all the tissues take the normal stain cancer can be excluded. Failure of the stain indicates

certain other abnormal conditions, two of which, leucoplakia and intensive cervicitis, are potential precursors of cancer and require treatment. The test is recommended for trial to the general profession. ROSS MITCHELL

Anæmia of Pregnancy. Rowland, V. C., *J. Am. M. Ass.*, 1933, **100**: 538.

The high incidence of some degree of anæmia in pregnancy, when looked for, and the demonstration of food deficiency factors in its etiology establish the great preventive opportunity in prenatal and health examination work. It has been stated that, next to tests of the urine and blood pressure, a blood count is of the greatest importance during pregnancy. The pernicious form of the anæmia, untreated, has had a 65 per cent mortality. In none of 500 cases on record had prenatal care been given. The secondary form of pregnancy anæmia, by lowering of resistance, may dispose to a variety of obstetric complications and infections. Liver extract is specific in pernicious or hyperchromic anæmia of pregnancy. The anæmia is due to a relative or temporary deficiency of a specific hæmogenic substance produced in normal gastric digestion. This substance is apparently identical with that lacking in true Addisonian anæmia. Iron in dosages of from 90 to 120 grains a day is specific in the secondary or hypochromic anæmia of pregnancy. This anæmia is probably due to dietetic deficiency and to faulty absorption of the hæmatogenic substance on account of gastro-intestinal disturbances.

These anæmias occur in slight degree in the majority of American women during pregnancy, and are associated with hypochlorhydria and a deficiency in the specific intrinsic factor involved in blood formation. The mechanism of hæmatogenesis, ordinarily quite adequate, is apparently overstrained by the metabolic overload of pregnancy, and likewise by various infections, toxic agents, and marked nutritional deficiencies. Pernicious anæmia can hardly be regarded as one specific disease, but rather as a non-specific failure of hæmatogenesis, due to a variety of causes that operate through the common mechanism of a deficiency or disorder of gastric function. In the rare case of severe pernicious anæmia of pregnancy the intramuscular or intravenous use of liver extract may be life-saving, either before or after delivery. The response may be noted within thirty-six hours. If the patient survives the first five days, she may be expected to recover. Transfusion is useful as an emergency measure only. Termination of pregnancy is indicated mainly by serious complications.

Obstetric morbidity and mortality statistics might be improved by applying the newer methods of treatment and prophylaxis in anæmia in prenatal work, in order to bring the blood up to full normal. ROSS MITCHELL

Urology

Kidney Lesions as a cause of Gastro-intestinal Symptoms. Colby, F. R., *J. Urol.*, 1932, **28**: 419.

Symptoms in the urinary tract may simulate so closely those of lesions of the intestinal tract that the correct diagnosis is frequently obscured. In a group of persons with hydronephrosis 30 per cent had undergone abdominal exploration, in the experience of one observer. Similarly calculous disease, uræmia, etc., may confuse. Such symptoms are thought to be produced in a reflex manner through the sympathetic nervous system in the same way that a spasm of the gastric musculature may result from an inflamed appendix.

The renal plexus arises by fibres from the solar plexus, the splanchnic nerves, the inferior mesenteric ganglion, a branch from the first lumbar sympathetic ganglion, and, probably, fibres from the vagus. These trunks follow the arteries to their termination and divide with them. Through the superior and inferior mesenteric ganglia the renal plexus is connected with the sympathetic nerve supply of the stomach and intestines. Direct nerve fibres also connect the renal plexus with other plexuses, the right kidney being most intimately connected with the stomach and small intestine, and the left with the descending colon and rectum. This association possibly accounts for the greater frequency of dyspeptic symptoms from right-sided than from left-sided kidney lesions.

Three cases are reported to illustrate the point. In the first a very large hydronephrosis was giving rise to attacks of projectile vomiting accompanied by abdominal pain and nausea. The distress was relieved by vomiting and had improved under a milk diet. X-ray examination had shown a displaced duodenum, with a large gastric residue after twenty-four hours. There was also a niche in the stomach which had been thought to be an ulcer. A Graham test had failed to show any filling of the gall bladder. Because of the presence of a mass in the right upper quadrant a urological examination had been undertaken and had disclosed the hydronephrosis. Complete relief had followed its removal. The second case was that of a nurse who complained of intermittent attacks of nausea and vomiting with much gas. Complete physical and x-ray examinations were negative and for the sake of thoroughness a cystoscopic examination was made. The right renal pelvis was moderately dilated with angulation of the upper ureter. The urine was sterile. Suspension of the kidney with division of an obstructing vessel gave complete relief. In the third case there was a history of stomach trouble which had been relieved by removal calculus but which had returned some months later. A pyelogram showed a much dilated and deformed

renal pelvis on the right side. Operation showed the cortex to be much thinned out and the kidney was removed. This patient also recovered completely from her stomach symptoms.

N. E. BERRY

Orthopædics

Calcareous Deposits in the Supraspinatus Tendon. Elmslie, R. C., *Brit. M. J.*, 1932, **20**: 190.

The occurrence of shadows in skiagrams of the shoulders was first recognized by Painter, of Boston, and was thought by him to be due to thickening of the subdeltoid bursa. In four cases which were operated upon a cheesy substance was found, resembling the contents of a wen. Codman, who was present at one of these operations, stated that the mass was deep to the bursa and on the great tuberosity. The contents resembled those of a dermoid cyst. The author points out that the subdeltoid bursa is sparingly described in most works on anatomy. It is mentioned in Quain's anatomy without description; in Cunningham it is briefly mentioned. He would prefer calling it a space lying in the areolar tissue, with some strands which may cross the cavity and divide it into different compartments. It does not appear to have a definite lining. He reports 8 cases which have come under his observation. They occur in adults of all ages and can be divided into acute, and those which are chronic with acute exacerbation. Injury had not occurred in every case, and, when occurring, is often very indefinite. Trauma appears to light up the condition in a case of old-standing. The accompanying pain may be very severe. The most persistent clinical sign is the tender spot on the top of the great tuberosity. Movement is little restricted in chronic cases, but when the condition is acute there may be muscular spasm. The appearance by x-ray is characteristic. The condition may be taken for a loose body in the shoulder joint, but the shadow is usually situated too far out and sometimes there is a change of shape on motion which would suggest a sac containing opaque fluid rather than bone. In some cases there may be an area of rarefaction in the great tuberosity.

Removal of the calcareous matter gives the quickest relief in the acute cases and the most satisfactory result in the chronic. The best route is along the anterior border of the deltoid. There is a very characteristic appearance, with a central yellow patch looking like an abscess and inflamed tissue surrounding. In the chronic cases one may be able to demonstrate the calcareous material only by an incision into it in the line of the supraspinatous tendon. The lesion is dealt with by excising it completely down to the bone or by opening and curetting. The bone beneath the insertion of the tendon should be examined, to make sure whether it does not contain a cavity. This procedure, of course, necessitates opening the shoulder joint. In none of the cases was a tear of the supraspinatous tendon found.

The histological appearances of the material removed at operation show the changes that would be expected in acute or chronic inflammation around calcareous matter acting as a foreign body. There is nothing to suggest necrosis. The cultures were all sterile. The analysis of the material from one of the cases showed calcium stearate. Analyses by Painter and Brickner showed various calcium salts. The author, as a result, states there must be some local anatomical cause. The most obvious would be a tear of the insertion of the supraspinatous tendon, with resulting effusion of blood and fatty tissue from the cancellous spaces. Calcification follows and the mass acts as a foreign body.

F. H. H. MEWBURN

Ophthalmology

The Eyes of School Children. Jackson, E., *Am. J. Ophth.*, 1932, **15**: 901.

Errors of refraction in eyes of children are of great importance. They are not anomalies in the sense in which a coloboma of the iris is an anomaly. They are rather failures of the human eye to develop with such exactness of proportions as best fit it for the accurate focusing of letters and small objects. More than 99 per cent of all children are hyperopic at birth, and their accommodation is inadequate for continual accurate near vision. Visual disability for school work may come from ordinary moderate errors of refraction, from congenital defects, from the results of ocular disease in early childhood, from congenital amblyopia, imperfect coordination for binocular vision or instability of the nervous system, that will make moderate nerve strain disastrous, or from lowered nutrition due to general disease. The examination to determine the child's fitness for school work must cover all these points. There are other things to be considered besides the need for glasses, and even the need for glasses cannot be fairly estimated without considering the general physical condition of the child. A complete health and eye examination of every school child is an immense extension of health service to the community. The testing of vision is an essential part of the examination for school children, and is a health examination intended to secure health by avoiding preventable disease. Such examinations and the benefits that arise from them will have an important influence in educating the public as to the difference between the educated doctor of medicine and the quack.

S. HANFORD MCKEE

The Etiology of Phlyctenulosis. Lasky, M. A., *Am. J. Ophth.*, 1932, **15**: 725.

In spite of the fact that much research has been done to determine the etiology of phlyc-

tenular disease, the true cause of this condition is still a matter of dispute. The preponderance of opinion seems to point to tuberculosis as the essential factor in the production of the phlyctenules. Recently a number of articles have appeared that vigorously dispute the tubercular nature of the phlyctenules. Goldenberg and Fabricant do not hesitate to state that phlyctenulosis is not due to the tubercle bacillus or its toxin. They further assert that the tuberculin test is unreliable. Glover after a careful review of 1,000 cases of pulmonary tuberculosis including 600 children, found only two cases of phlyctenulosis, and both patients were suffering from rickets; and he therefore believes he is justified in stating that "the fact that tuberculosis and phlyctenulosis are related, is an ancient superstition." It is undoubtedly true that among the many thousand cases of phthisis, there are few cases of phlyctenulosis. This however does not seem to justify the conclusion that the two entities are not related. The opinion of numerous investigators is given, and the writer concludes that the phlyctenule is somewhat analogous to the Mantoux reaction in that both result from inoculation with tubercle bacillus protein, and both are allergic reactions. Neither would occur if the body had not been sensitized to the tubercle bacillus by previous tuberculous infection that had been successfully overcome by the body's defensive mechanism.

S. HANFORD MCKEE

Therapeutics

Hæmophilia. Birch, C. L., *J. Am. M. Ass.*, 1932, 99: 1566.

The authoress and her associates present a study of 35 cases, 28 of whom give a definite family history of hæmophilia. They worked out twenty family trees showing the hæmophiliac strain. All cases are in accordance with Nasse's law. A mathematical analysis of these genealogical charts shows that the children of persons with hæmophilia are more apt to be female than male, and those of the transmitters, to be male than female, and that over 71 per cent of these males were hæmophilic.

The authoress treated 19 of her cases by the subcutaneous, intramuscular and oral administration of preparations of ovary. The treatment of hæmophilia by ovarian substance is based on the supposition that the female who transmits the disease to her male offspring must be potentially hæmophilic, but is protected by some internal secretion peculiar to her. The best results were obtained with whole ovarian substance. From 15 to 120 grains a day were given, starting with small doses and increasing until the maximum result was obtained. Theelin was found of value during the bleeding phase, but was of no value in continued treatment. Most of the cases showed a specific and general improvement. The latter was shown by an increase in weight, growth and hæmoglobin, and by an improvement in vitality. The specific response was shown by a reduction in the number and severity of the hæmorrhages and by a shortening of the clotting time to one-half or one-quarter of the original. Those in whom the coagulation time was reduced to one hour or less were found to be relatively safe from hæmorrhage. Infections were found to increase the coagulation time.

The blood in hæmophilia is morphologically normal. Prolongation of the clotting time is due to an increased resistance of the platelets. If the plasma of hæmophilic blood be separated from the cells, and the platelets in this plasma be ruptured in a mortar with a pestle by friction for two minutes, when the plasma and cells are again mixed together, clotting will take place in almost normal time. The author found that when certain ovarian preparations were added to hæmophilic blood in a test tube, the coagulation time was decreased to one-half or one-quarter of that of the control. H. GODFREY BIRD

Neuroparalytic Accidents Complicating Antirabic Treatment. Stuart, G. and Krikorian, K. S., *Brit. M. J.*, 1933, **1**: 501.

Paralytic accidents are at all times a rare complication of antirabic treatment; the proportion of such accidents to the number of cases treated varies according to the method of vaccination. Former statistics have always proved the superiority of carbolized vaccine over all others in this respect. In this communication, however, the occurrence of 3 cases in Palestine following this type of treatment during a three months' period in 1932 is reported. None of the 3 patients was definitely bitten by a rabid animal. One of the cases was a male of 29 who died of an ascending Landry-type of paralysis; another was a boy, aged 5, who also died of the same type of paralysis; while the third, a girl, aged 5, who recovered after six weeks from a comparatively mild dorso-lumbar myelitis. It is noted that all the cases previously reported have been over the age of 5 years. Perdrau, Greenfield, Marsden, Hurst and others have already suggested the inclusion of this complication within the group known as acute disseminated encephalomyelitis, (capable of production by a number of heterogeneous factors, such as small-pox, vaccinia, measles, etc., and characterized by perivascular zones of demyelination together with some degree of perivascular cuffing). The pathology of the 2 fatal cases reported, however, does not agree with previously published cases. In the brain and spinal cord little was found beyond varying degrees of degenerative change in the nerve cells, together with some vascular congestion and occasional hæmorrhage. Nor did the pathology in any way resemble that of rabies. The authors again advance a cyto-

toxic, rather than a virus, theory of origin, suggesting that in the basic nerve substance of all antirabic vaccines some deleterious component exists capable of producing neuroparalytic disorders in susceptible individuals by various physical and chemical agencies.

W. FORD CONNELL

Hygiene and Public Health

The Venereal Disease Situation in Canada. Parney, F. S., *Can. Pub. Health J.*, 1932, **23**: 553.

A summary of the situation throughout the Dominion is presented, based largely on the opinions collected from those chiefly interested in this work through the provincial clinics. In this connection a marked increase in attendance at these clinics is noted, but this is taken as an indication of increasing confidence rather than an actual increase in prevalence of these diseases.

Hospital statistics show a decrease in cases of congenital syphilis among infants and, in adults, of the terminal stages of neuro- and vascular lues, while there is some increase in primary and latent stages. In neither case can the decrease be attributed to a reduced incidence but rather to earlier and more efficient treatment, owing largely to the better education of the public, which also accounts for the increase in the number of patients reporting in the primary stage. The custom of routine blood examination in many general hospitals has discovered numerous cases of latent syphilis and subsequent treatment has prevented progression to the terminal stages.

While admitting that our position as regards the control of syphilis has improved, still further effort is necessary if the public is to be educated as to the treacherousness and far-reaching results of the disease and the need for early and prolonged treatment. Our position in regard to gonorrhœa is less favourable, and unfortunately the rank and file of the profession lack sufficient experience in the treatment of the disease, and it is the general experience of those working in large centres that much harm is done by too heroic methods. The opinion is expressed that practitioners should be furnished from time to time with details of the latest scientific treatment in the most concise form.

To consider these matters conferences of the clinicians actually engaged in the Government and hospital clinics were held in Edmonton, Montreal, and Toronto, during 1931. The opinion expressed at this gathering was that our present-day medical knowledge of the early diagnosis, treatment, and prevention of syphilis is such as to permit of as complete control as we have of small-pox, typhoid, etc., provided public opinion would support similar action; the same applies to gonorrhœa to a lesser extent. Recognizing the difficult task of preparing and presenting effective educational material on such a delicate subject, it is recommended that intensive venereal propaganda by means of lectures, moving pictures, literature and public addresses, etc., be continued, with a view to still further enlightening the public as to the existence and devastating effects of the disease.

In the actual operation of clinics the importance of gaining the patients' confidence, so that he will persist in treatment and the follow-up of contacts, is stressed. It was also felt that early post-exposure treatment was of definite value, and facilities for obtaining the same should be provided in all clinics. The efficacy of induced hyperpyrexial treatment of neurosyphilis was admitted, and it was thought that this treatment should be more generally available, so that more cases might be treated before mental deterioration was apparent.

It was felt that the teaching of the treatment of gonorrhœa in our medical schools should be further stressed; that the younger men should see more work in clinics so that they would be more able to efficiently treat the disease and fewer cases of mal-treatment would therefore be seen.

The public must be made to realize that venereal diseases are preventable, that their blight settles upon the innocent as well as the morally delinquent, and therefore for humanitarian reasons alone the time must come when an enlightened and unprejudiced public will demand that the problem which they create be attacked in a commonsense scientific manner, looking toward their complete eradication.

N. E. BERRY

Automobiles Kill Fewer Children. Statistical Bulletin, Metropolitan Life Insurance Company, 1933, **14**: 1.

Until fairly recently the experience has been in the United States that nearly 25 per cent of those killed by automobiles were children. This has been one of the most ominous features of automobile mortality. Recently, however, an improvement in this situation has become manifest, according to the records of the Metropolitan Life Insurance Company. During the years of the depression the general mortality from automobile accidents has fallen somewhat, but the fall has been relatively greater in the case of children, so that whereas formerly one automobile fatality in four was a child now less than one-fifth are children.

If one divides the industrial population in two groups—those under 15 years of age and those over fifteen—the trend is well illustrated by taking the mortality rates of two years. In 1922 the death rate of children under 15 was about 17.5 per 100,000, while that for persons over 15 was 12 per 100,000. In 1932 the position had been reversed. The death rate for the younger group was 14 per 100,000 and that for the older group 22.

FRANK G. PEDLEY

Pathology and Experimental Medicine

The Effect of Irradiation on Normal and Neoplastic Brain Tissue. Alpers, B. J. and Pancoast, H. K., *Am. J. Cancer*, 1933, **17**: 7.

Medulloblastoma, which shows more clinical improvement following irradiation than any other type of brain tumour, displays distinctive pathological changes after this type of treatment. There are a patchy death of cells, increase in the connective-tissue stroma, and some thickening of the walls of the blood-vessels. Even, however, after intensive irradiation the majority of the cells in the tumour appear to be in good condition. It is not possible to correlate the histological picture with the amount of treatment received. Ependymoma shows definite, though slight, evidence of tissue-destruction after irradiation. There is no evidence of any good effects obtained in the treatment of oligodendroglioma, spongioblastoma multiforme, or astrocytoma.

The pathological changes in normal brain tissue which result from irradiation consist in fatty degeneration in the cells of the cortex and in the Purkinje cells of the cerebellum, as well as a mild fibre loss in the cerebral cortex. These are not of such a degree as to be considered important, even with the large dosage employed nowadays. X-ray treatment of brain tumours may cause a reaction manifested by temporary increase of pressure symptoms, and for this reason preliminary decompression should be carried out in all cases. To obtain the maximal amount of irradiation on tumour tissue the external application of x-rays should be supplemented by radon implants direct into the tumour. FRANK A. TURNBULL

Acute Leukæmia Following Lymphosarcoma. Kato, K. and Brunschwig, A., *Arch. Int. Med.*, 1933, **51**: 77.

Lymphosarcoma anl lymphatic leukæmia have been regarded as two distinct entities. In recent years, however, the leukæmic state has come to be regarded as merely a phase of circulating metastases from lymphosarcoma. This implies that all patients with leukæmia have previously had lymphosarcoma, and that the condition may not have been clinically evident because of the deep location of the involved lymph nodes. The authors review numerous recent reports from the literature supporting this hypothesis and present two additional cases. Two children, aged 5 and 9, when first seen had lymphosarcoma with a normal blood picture. Roentgen therapy gave temporary relief with improvement of the local condition. However, a short time later acute lymphatic leukæmia developed, with a rapidly fatal termination. At autopsy the cases presented fatty bone marrow, and the direct smears from this marrow were quite cell-poor, indicating a state of aplasia.

The question is raised whether or not roentgen therapy produced deleterious effects on the hæmopoietic and other vital organs, thereby inducing the leukæmic state. L. J. ADAMS

Three Cases of Familial Congenital Cystic Disease of the Liver and Kidney. Lightwood, R. and Loots, G. H., *Proc. Roy. Soc. Med.*, 1932, **25**: 1230.

Four children in the family had been affected with congenital cystic disease of the liver and kidneys. Two were still living. One child had died at the age of two years. Autopsy had disclosed no ascites, a liver that was full of cysts of congenital origin, a hepatic fibrosis that was not due to any inflammatory changes, kidneys that were much enlarged and cystic, and a spleen five times its normal size. The other two children living were a girl and a boy. The girl, aged four years, had a much enlarged liver and spleen, kidneys not palpable, but with albumin present in the urine; the boy, aged 2 years, had an umbilical hernia, harelip, liver, spleen and kidneys that were much enlarged, and nodular. Albumin was present as well as red blood cells. This disease is hereditary, and probably due to recessive factors, for there is no history of the parents being affected. Indeed it kills its patients before the age of reproduction is reached. MADGE THURLOW MACKLIN

Rôle of Infection in the Production of Post-Operative Adhesions. Muller, G. L. and Rademaker, L. A., *Arch. Surg.*, 1933, **26**: 280.

Post-operative omental and intestinal adhesions are often a source of trouble, to such an extent some times that they give rise to more acute symptoms than the condition for which the operation was done. Infection and trauma have long been known to be important factors in the production of adhesions, especially early or protective adhesions. The etiology of the hardened or detrimental adhesions is not so well understood. By animal experimentation, the authors devised a means to determine the effect of infection of wounds in the production of adhesions in non-contaminated or "clean" cases. The abdominal wall was opened down to the peritoneum, and in each series of animals four layers of gauze of small size was introduced between the muscles and the peritoneum. In one series the gauze was sterile; in another it was dipped in 5 per cent tincture of iodine, and moderately dried before insertion; and in the final series it was dipped into a twenty-four hour broth of *B. coli*, moderately dried and put into place. In three months' time the animals were killed. Intra-abdominal adhesions were found in six of the ten with the *B. coli* gauze, in none with the sterile gauze, and in only 1 out of 10 with the iodined gauze. From these experiments the authors conclude that the primary etiological factor in the production of post-operative adhesions is infection. G. E. LEARMONTH

Obituaries

Dr. George Eli Armstrong. Montreal lost a distinguished citizen and medical science an outstanding leader, May 25, 1933, with the death of Dr. George Eli Armstrong. Dr. Armstrong died at 10:30 p.m., in the Royal Victoria Hospital, after an illness which lasted 10 weeks. He was 78 years old, and for many years had not only been one of Canada's leading surgeons, but had built up for himself a world-wide reputation, and had been the recipient of honours from scientific bodies in many parts of the world.

The loss of the brilliant surgeon, the able teacher and leader is one which cannot easily be retrieved; Dr. Armstrong however leaves behind him writings on many surgical subjects which will retain their importance in medical literature for many years to come.

Dr. Armstrong was born at Leeds, Que., the son of Rev. John and Harriet M. (Ives) Armstrong. He received his early education at public schools, Montpelier

Dr. George Eli Armstrong

Seminary and McGill University and spent several years in study abroad, principally in England, Germany and France. He received his LL.D. degree at Queen's University and his D.Sc. degree at Liverpool.

In 1909 he attained prominence on this continent when he introduced the use of radium to Canada following a stay in Paris where he studied its possibilities at the Radium Institute. At the time he was surgeon at the Montreal General Hospital, which post he had held since 1890. On June 3, 1911, he was appointed to the position of chief surgeon of the Royal Victoria Hospital. At this time he was named consulting surgeon of the General Hospital and of the Verdun Protestant Hospital. In addition to these positions of high standing, Dr. Armstrong was professor of surgery of the Medical Faculty, McGill University, and later dean of medicine of the faculty. He retired from the faculty in 1923.

One of Canada's most brilliant surgeons it was not surprising that his offer to serve his country during the Great War was eagerly accepted and in 1916 he was named consulting surgeon to the Canadian Expeditionary Forces with rank of Lieutenant-colonel. After two years' service to his country Dr. Armstrong was rewarded with a C.M.G. by his King, and in 1917 he was given the rank of colonel.

Recognized as one of the ablest surgeons in North America, Dr. Armstrong received many high honours, both here and abroad. In September, 1920, he presided at the tenth annual session of the Clinical Congress of the American College of Surgeons with which he had been connected for some years, having been named president of the college in October, 1919. In 1922 the degree of Majestra Chirurgia was conferred upon him by the Dublin University, while in 1931 he was granted an honorary fellowship of the Royal College of Surgeons. Dr. Armstrong was also a past president of the Canadian Medical Association and the American Surgical Association and a past vice-president of the American Society for the Control of Cancer and a member of the International Surgical Association.

At one time editor of the *Montreal Medical Journal*, Dr. Armstrong was a well-known writer on medical and particularly surgical subjects having been the author of many important papers and medical works. Dr. Armstrong was twice married. His first wife was Mary Hadley, daughter of Daniel Hadley, who pre-deceased him in 1876. His second wife was Jessie Reid, of St. John's, Newfoundland, who survives him. He also leaves one son and four daughters.

The following appreciations have been received.

APPRECIATION

The loss of a celebrated surgeon and a great friend impels me to express in a personal way my deep regard for his memory. I was indeed fortunate in having seen a very great deal of him in past years. We had travelled together overseas on five different occasions to visit British and Continental clinics. We visited Rochester and other centres several times. I saw much of him during the Great War. At Montreal and at meetings of the American Surgical Association we were frequently together. The coast of Gaspe found us in the autumns with rod and gun. There has truly passed out of my life a valued old friend.

With so many others I appreciated his strong and vigorous mind contained in so robust a frame. He wrote well and was endowed with power of expression in conversation as in writing; indeed his clinical instruction was remarkable and won fame for his University; his surgical abilities were outstanding in Canada, an unquestionable leader. He was a strong personality with decided views, generous and hospitable, a most interesting and stimulating companion. I saw him eight days before his death sitting in a chair in his room discussing many subjects of interest outside of his profession, as was always the case with him, but sadly changed in appearance by illness. It was only because it was the closing day of Parliament that it was impossible for me to pay my affectionate respects at his funeral.

A great figure in the medical profession has gone from us.

MURRAY MACLAREN

In the year 1911, upon the death of Dr. James Bell, Dr. Armstrong was invited by the Governors of the Royal Victoria Hospital to undertake the position of Chief Surgeon in that Hospital. Dr. Armstrong accepted, and his tenure of office lasted to the year 1923, when he tendered his resignation, being then full of years and of honours. Being of an unusually strong constitution he was fortunately able to enjoy to the full a further ten years of tranquillity, with leisure for those things in life which he had always been fond of but had had so little time to indulge in, especially reading and the quiet games of golf and billiards. The period of his retirement was, as he told the writer, one of serenity and a quiet happiness.

During the twelve year period of his active work in the Royal Victoria Hospital, as Chief Surgeon, we, his junior colleagues, had frequent occasion to admire the breadth of his clinical experience, the soundness of his

judgment, his eagerness to keep up with all the developments of surgical science, and, finally, in the university part of his work, the high value of his teaching. He was always a man of great openmindedness; not only willing but eager to discuss clinical problems with his juniors; possessed of a real humility in science, ready to learn from anybody, and ready to give to anybody whatever knowledge he himself possessed. With regard to the work in the public wards, he was the real hospital man. He spared neither time nor pains with the public patients and he was always kind to them. Towards his juniors on the staff he was generous in giving them opportunities for independent work, and he was always their friend. One of his greatest interests lay in the teaching of students, and throughout his career he possessed the admiration, respect, and the affection of students. Graduates always remembered and spoke of "Armstrong's clinics." This was no wonder, for all his life he burnt much midnight oil in preparing his clinics. The writer, though nearly twenty years his junior, keeps the memory of a long period of friendship, both before and after his appointment to the Chief Surgeonship to the Royal Victoria Hospital; keeps the memory of many ward consultations; of occasional games of golf and of billiards; of many discussions both of medical and of general matters, and of not a few pregnant sayings concerning life and the philosophy of life.

EDWARD ARCHIBALD

To the majority of readers of our *Journal* Dr. Armstrong's death signals the passing of one of Canada's outstanding surgeons; to a smaller number it means a more personal loss, the loss of teacher and friend. Blest with a sound constitution, inspired by an almost boundless enthusiasm in the ever-widening scope and perfection of the principles and practice of surgery, he devoted himself heart and soul to secure better and yet better results in his special line of endeavour. Promotion was neither early nor easy but it was rather by sheer ability that he became recognized as one of the leading surgeons in his own country and fully earned the international reputation and honours bestowed upon him. It is, however, as a teacher that Dr. Armstrong will be best remembered and esteemed by those whose good fortune it was to have attended his clinics. To many of these men must surely have come the remembrance of the presentation at theatre clinic of a case similar to the one causing them anxiety, and what a relief that remembrance brought them and what added benefit to the patient. The writer of this humble attempt to express an appreciation of a really great teacher can testify from an association with the late Dr. Armstrong during fourteen years of his busiest work that his chief never gave a theatre clinic without careful selection of the cases and due preparation for their presentation. To Dr. Armstrong his clinic was the all-important thing and nothing was allowed to interfere with it. It added enormously to his work but he loved teaching and gave unstintedly of his best to his students. That they appreciated his efforts was abundantly proven by the many letters he received from former undergraduates reciting some case in which the remembrance of a clinic had helped them or asking advice in some puzzling case.

One of the chief factors of his success was his attention to detail in operative technique. He was neither a spectacular nor a rapid operator; rather was his work characterized by a deliberateness in which every motion attained its purpose, with the result that no time was lost and the onlooker was apt to be a little surprised at the comparatively short time the operation had occupied. It may be of interest to know that the two operations he found most difficult to learn to perform to his satisfaction were the radical cure of hernia and gastro-enterostomy. That he eventually mastered the technique of these two operations is fully attested by those who were privileged to assist him; in his hands they became real works of art. Ever seeking new avenues of endeavour it is not surprising that he was among the first to operate successfully for acute appendicitis, splenectomy in so-called Banti's disease, perforated typhoid, and recurrent massive hæmorrhage in gastric ulcers.

He worked a full day and every day for many years, brought honour to himself and the medical school and hospitals in which he taught and lived to enjoy what is perhaps the greatest source of satisfaction to any one, the realization of a high endeavour successfully accomplished.

WALTER L. BARLOW

Dr. Henry Adams, of Embro, Ont., veteran of the American Civil War, and one of the pioneer medical practitioners of the province, passed away quietly in this city a few days ago, at the age of 98 years. Until February, 1932, he had lived in Embro Village, where he had practised medicine since a young graduate. He was a graduate of Eclectic Medical College, Pa., in 1864 (M.D.); University of Toronto (M.B.) in 1904.

One of the outstanding features of his picturesque career was when he fought, almost single-handed, an epidemic of smallpox which was raging in the Zorras. At that time people were even more afraid of the dread disease than they are now, and he had to act as doctor, nurse and undertaker, as no one would go near those stricken. Indeed, it is said, they would not go near the doctor, for fear of contracting the disease. And when vaccination became a method of prevention, Dr. Adams was incensed at the reluctance of people to be treated.

Dr. Adams was a friend of the Cody family, of which the President of the University of Toronto is a distinguished member.

The story is told that when President Cody's father died some six years ago, at the age of 82, Dr. Adams came to be present at the funeral. After looking in the casket, he inquired as to the deceased man's age, and was informed that it was 82. "Why, he was a mere boy," remarked Dr. Adams, then in the neighbourhood of 92, and enjoying good health.

Dr. Adams was at one time Reeve of Embro Village, and later contested a provincial election, running as an Independent.

Dr. J. Baulne died at Saint-André-Avelin on April 29th at the age of 79. He was born at Saint-Hermas November 1, 1859, where he studied at the normal school and then went to the University of Victoria Medical School. He was in practice at Saint-André-Avelin for 45 years and leaves a memory of entire devotion to his work.

Dr. Geo. Etienne Bédard died at his residence in Montreal on June 2nd at the age of 57. He was born at Saint-Rémi de Napierville in 1877, and studied at the College of Montreal. He graduated from the University of Laval, Montreal, in 1903, and then spent eighteen months in Europe on special studies on diseases of the nose and throat. He practised at Saint-Rémi from 1904 to 1909, then returned to Montreal where he was attached to the Hôtel Dieu.

Gordon MacKenzie Hume, M.D., C.M., (McGill, 1905), **F.A.C.S., F.R.C.S.(C.)**, died at Sherbrooke, Que., April 10, 1933, following an illness of several months. Seriously incapacitated for some time previous to being confined to his room, he continued to keep up a considerable proportion of his operative and consultation work, with an unselfishness which must have been a great drain on his undermined system. For an individual whose energy and capacity for work, and enjoyment of social and out-of-doors activities was so great, the manifest subjective signs and symptoms of his renal deficiency must have been a trying ordeal for a man of his type to have constantly before him, yet throughout this period he

refused to admit to any of his associates his real disability; assuming that optimistic attitude which so often gave his patients that sense of security by his mere presence in the sick room.

His ability as a surgeon early manifested itself, coupled with a very extensive general practice of the Old School, numbering among his patients many prominent citizens of the Eastern Townships and Northern Vermont. As a general practitioner he was always the counsellor and friend, never refusing a call, undertaking long arduous trips in every sort of weather, giving his all to the poor and needy. His connections with the Sherbrooke Hospital were of the keenest character, devoted to people from all walks of life, with special interest in fractures, for which he had a remarkable aptitude. Frequent visits to clinical centres, a prolific reader kept "Dr. Gordon," as he was affectionately called, well in the van of all recent medical and surgical progress. A grand man has passed from our midst — enthusiastic practitioner, philosopher, student, lover of nature, a splendid golfer. The profession has lost a disciple of whom it may be said with feeling can hardly be replaced. Hundreds mourn the loss of a wonderful friend, doctor and counsellor. W. W. LYNCH

Dr. S. A. Joncas died on April 18th after a short illness at Saint-Vallier at the age of 55. He was educated at the Seminary of Quebec, from which he went to the University of Laval, Quebec, where he graduated in 1904. His practice had been at Saint-Vallier for the greater part of his life.

Dr. K. M. Lindsay. The many friends of Dr. Kenneth Lindsay were shocked to hear of his death on March 11th. Following his graduation he interned at Victoria Hospital and the next year was appointed Resident in Surgery. He then took up state hospital work at Buffalo, N.Y., remaining there until early in 1933, when, after six weeks' illness, he came back to London. He apparently was improving in health when he had a sudden relapse and died a few days later.

Ken will be remembered as one who had Western University's interest at heart. He played football for many years, in fact until he was advised to give it up on account of his health. He was a prominent member of the interfaculty hockey team and for a year a member of the basketball team. He was a real man, and the most popular member of our class.

His friends and acquaintances extend their heartfelt sympathy to his family. Dr. John C. Lindsay, his father, is a well-known and popular member of the Faculty and his wife was formerly Miss Alma Carrothers, a graduate of Victoria Hospital.

Dr. Rowland Beatty Orr. The death on May 28th at the age of 81 of Dr. R. B. Orr, Curator of the Provincial Museum in the Normal School, removes from the scene an interesting and widely known character. Dr. Orr graduated from the University of Toronto in 1877. He was a highly qualified member of the medical profession, but also had many other interests. Archæology claimed his special attention, and when among the remarkable collection of antique objects in the Normal School he was in his favourite surroundings. He had been President of the Ontario Historical Society and Secretary of the Provincial Archæological Society; also an active politician, being one of the oldest members of the Albany Club. The doctor was an interesting conversationalist, with an astonishing fund of information along many and diverse lines.

Dr. Arthur F. Rykert, of Dundas, well-known Coroner of North Wentworth, former Provincial member for that riding, and active in the militia for many years, died May 30th in the Toronto General Hospital following a sudden illness which seized him while on a fishing trip.

Dr. Rykert was 63 years of age and was born in St. Catharines, the son of J. C. Rykert and N. M. Hawley Rykert. His father and grandfather were strong Conservatives and represented Lincoln County in the Dominion House. Dr. Rykert graduated from the University of Trinity College Medical School in 1893, and then proceeded to England for post-graduate studies and became a member of the Royal College of Surgeons, London, and a licentiate of the Royal College of Physicians. On his return to Canada, Dr. Rykert engaged in practice in Dundas.

In 1914, he was nominated by the Conservatives of North Wentworth as member for the Legislature and contested the election successfully. He went overseas with the 176th Battalion in 1915 as Medical Officer, and later was transferred to the British Expeditionary Force, with which he served in England and France for the duration of the war.

Dr. Omar M. Wilson, noted Canadian dermatologist, and Canada's representative to the World Dermatological Congress at Copenhagen in 1931, died suddenly on May 18th, at his residence, 185 Metcalfe Street. He was 52 years of age. Dr. Wilson was one of the leading members of the medical profession in Ottawa and his death is a serious loss to the medico-chirurgical circles of the city as well as to the science of medicine at large. He had been engaged in his usual work until 3.30 o'clock in the afternoon, when the fatal attack began. Shortly after he collapsed, Dr. E. P. Quinn was called, and consulted Dr. Atholl M. McNabb. In spite of their aid, Dr. Wilson died about 7.30 o'clock. His death was ascribed to coronary thrombosis.

Omar Matthew Wilson was born in 1880 at Smiths Falls, Ont., son of the late Matthew and Sarah Wilson. He was educated at the local public and high schools and later entered the medical school of McGill University, where he graduated, in 1904. He spent five years in post-graduate work at the Skin and Cancer Hospital in New York City, and on two occasions took post-graduate work in Vienna, London, Berlin and Paris.

Since the establishment of the Ottawa Civic Hospital he had been dermatologist to that institution, and was consultant dermatologist to the Ottawa General Hospital. Few men had accomplished so much in such a short period of time in his chosen specialty. He had done a great deal of original research work in his special field in medicine and originated the vaccine treatment of primula dermatitis. His special work in the field of psoriasis was outstanding. He was also a pioneer in x-ray and radium work.

Dr. Wilson had established a splendid practice in Ottawa and hosts of patients will learn of his sudden death with keen regret. He was past-president of the Ottawa Medico-Chirurgical Society, and of the Dominion Dermatological Association. He was a member of the Atlantic States Dermatological Association of the United States, and had contributed many papers at medical society meetings and to medical journals.

He was one of the most active and energetic members of the medical fraternity in the Capital, and was wrapped up in his profession. Keenly interested in all matters affecting medicine, he was chairman of the committee of the Ottawa Medico-Chirurgical Society in the establishment of an Academy of Medicine here.

Holding an appointment on the Reserve of Officers in the Canadian Medical Corps, Dr. Wilson was closely associated with the former No. 2 Field Ambulance, and, since reorganization, took a close interest in No. 23 Field Ambulance, Ottawa. His interest in military and veterans' affairs was heightened by his connection with the Department of Pensions and National Health, to which department he was consulting dermatologist.

In religion he was a member of the United Church of Canada, and worshipped at Chalmers Church. He was a member of the Rivermead Golf Club and the Rideau Curling Club, and was a keen follower of all branches of athletics.

News Items

Alberta

A special meeting of the Committee on specialists in medicine and in surgery, was called to meet at Edmonton, in the University of Alberta, on May 12, 1933. In addition to passing on the applications for specialists' certificates, amendments to the regulations were also considered. When the regulations concerning "medical specialists" came into operation, it was felt that those physicians who had been practising in special lines of work prior to the passing of the enactment, should have due consideration, hence the following amendment was passed: "Candidates who were registered as members of the College of Physicians and Surgeons of Alberta, prior to the enactment of these regulations shall receive due consideration for the length of time of practice and for the experience obtained during that time in the speciality for which a certificate is sought. As the amendment to the Medical Act providing for specialists, was passed in 1926, it is felt by many of the committee that those who were desirous of obtaining their certificates, have had ample opportunity of applying for them up to the present time, so that this amendment should be cancelled.

During the past session of the Provincial Legislature, the progress report on health insurance brought forward by the commission appointed in 1932 was accepted. Neither the principles or the details involved were discussed. The commission was re-appointed to make further study of the subject and requested to make a final report for the next session of the Legislature. In the meantime, there are between fifteen and twenty committees of physicians in various parts of the province, making thorough studies of the suggestions made in the progress report, and the results of these studies will be forwarded to the council of the College of Physicians and Surgeons of Alberta.

The Provincial Department of Health has reported the maternal death rate for the past three years. In 1920 there were 117 deaths, in 1931, 77 and in 1932, 57, which shows slightly more than a 50 per cent reduction for 1932. In 1931 over three-fifths of the deaths occurred before the end of the sixth month of pregnancy. The maternal death rate for 1,000 living births was 3.4, the lowest in the history of the province, and 28 of the 77 women who died had no prenatal care. A special committee of the Alberta Medical Association is making a careful survey of the statistics on maternal deaths to present a report at the next annual meeting of the Association.

The charge to the mill-rate from operation of the Calgary Municipal Hospitals during the first four months of the present year was $31,175.27, a decrease of $6,194.63 compared with the same period last year. The charge to the mill-rate in April amounted to $5,793.51 compared with $5,771.86 for April, 1932. Expenditures for the first 4 months totalled $76,312.09 against $87,451.30 in the same period of 1932. Revenues amounted to $45,136.82 against $50,081.40 in the first four months of last year. April, 1933, expenditures and revenues were $18,039.42 and $12,245.91 respectively. Expenditures for April, 1932, were $21,170.33 and receipts $15,398.47.

Under the auspices of the Alberta Medical Association, two post-graduate tours have been arranged. Dr. R. H. L. O'Callaghan, F.R.C.S.(C.), and Dr. E. P. Scarlett, F.R.C.P.(C.), both of Calgary, will visit several centres in the northern part of the province where Dr. J. A. McPherson and Dr. A. Day, of the University of Alberta, will conduct lectures and clinics in several of the smaller towns. Edmonton will not be included, nor will Calgary in the southern part of the province.

At a recent meeting of the Council of the College of Physicians and Surgeons of Alberta, a day was spent in an endeavour to find an acceptable and reasonable solution of the question of rendering medical care and attention to those who are indigent or on civic or other form of relief. The unemployed who are on relief, are almost all in the larger cities and it has been suggested that one solution would be for the authorities to set aside a sufficient sum of money, which would be placed in the hands of a special committee, for disposal among the physicians in each centre. This sum should be the equivalent of a fair income for each of the physicians required to care for the members of the population on relief. The committee would pay each physician according to the amount of professional work done at reasonable rates. Every patient would have the right to choose his own physician.

The second annual "refresher" course was given at Edmonton from May 29 to June 2, 1933, by members of the Faculty of Medicine of the University of Alberta. In every way this was most successful except from the viewpoint of attendance which was not as large as last year, no doubt owing to present conditions. Ward demonstrations were given in medicine, surgery, urology, neuro-surgery, gynæcology and obstetrics. There were symposia on fractures of the upper and lower extremities and on back pain. Practical work in surgery was a feature of the course.

Certain urban hospitals have been making contracts with rural municipalities for the care of indigent patients at a stated rate per diem. This is a question for discussion, whether such contracts should be made, when there are other hospitals nearer to the municipality from which the patients come. Presumably, such patients will receive medical or surgical care at the expense of members of the attending staff, without any contribution from the municipality which made the contract. The pertinent question is, what attitude should the attending physicians take under such circumstances, as without a medical staff no hospital could make such a contract?

Dr. Helen O'Brien, of Notikewin, has returned to her home in England. She is the last of the three women physicians to give up their work in the outlying districts, where they practised under direct contract with the Provincial Government. Dr. O'Brien rendered splendid services to pioneer settlers under most trying circumstances. This was a type of "state medicine" which had many drawbacks.

The special Commission appointed by the Provincial Legislature in 1932, presented a progress report to the Legislature last February and was reappointed to continue the work on health insurance, and requested to make a final report in 1934.

In view of present financial conditions and the suggestion that a complete medical service to all the inhabitants of Alberta would cost this province at least ten million dollars, it is not considered likely that any definite action will be taken in the near future. This Commission held a meeting last week and decided to investigate the present hospital situation, so that these results may be incorporated in the final report. It looks as though there may be difficulties in arriving at any definite decisions, as hospitals have not been erected with the idea in view that each and every one would be incorporated in a provincial wide scheme, which would eventuate if health insurance became a reality.

G. E. LEARMONTH

British Columbia

The newly reorganized Vancouver Tuberculosis Association held its first annual meeting on June 7th, when officers were elected and plans formulated for a more intensive campaign during the coming year.

It is announced that a 20-bed hospital will be constructed in Smithers, B.C., by the Sisters of St. Ann. It is expected that the hospital will cost $30,000.

The Provincial Board of Health has issued an appeal to School Medical Officers urging that statistical reports should above all things be accurate as the returns furnished form the basis of much useful information.

C. H. BASTIN

Manitoba

Members of the medical profession in Winnipeg were delighted with a clinic given by Dr. Edward Archibald, Professor of Surgery, McGill University, in the Board Room of the Winnipeg General Hospital on May 27th. Dr. Archibald discussed several cases affected with lesions of the gall bladder and stomach. A dinner was given in his honour at the Manitoba Club that evening.

Dr. J. E. Lehmann, of Winnipeg, has been appointed to the Board of Governors of the University of Manitoba and Dr. O. H. McDiarmid, of Brandon, is among those nominated for the same board. From the ten nominees three are to be selected by the Alumni of the University.

The annual meeting of the Winnipeg Medical Society was held in the Medical College on May 19th. Dr. F. J. Hart, retiring president, gave an able address on the work of Richard Bright. The election of officers resulted as follows: *President,* Dr. E. P. MacKinnon; *Vice-President,* Dr. W. E. Campbell; *Secretary,* O. C. Trainor; *Treasurer,* C. E. Corrigan, and *Trustee,* Dr. S. Rodin.

The annual meeting of the Manitoba Medical Association will be held in the Fort Garry Hotel, Winnipeg, September 7, 8 and 9, with Dr. A. F. Menzies, President, in the chair. The Canadian Hospital Association will hold its annual meeting at the same time and it is expected that there will be at least one joint meeting of the two associations.

Dr. Noel R. Rawson has resigned his position as Epidemiologist for the Province of Manitoba. It is understood that Dr. Rawson will return to England. A dinner in his honour was held in the Medical Arts Club Rooms on May 15th.

In the interests of economy the Department of Health and Public Welfare in Manitoba has been obliged to discontinue the distribution of insulin free of cost. The department will, however, supply insulin to municipalities at half the wholesale price if they in turn will supply it to indigent patients free.

R. MITCHELL

New Brunswick

Dr. D. P. Mahoney, Saint John, is rapidly recovering from a rather severe illness.

At the May meeting of the governing board of the Fredericton Victoria General Hospital, it was decided to install an additional $5,000.00 worth of new x-ray equipment.

Lieutenant-Colonel G. G. Corbet has been advised that he is to be invested with the decoration of an officer of the Grand Priory in the British Realm of the Venerable Order of the Hospital of Saint John of Jerusalem. This decoration is one of 61 granted this year.

Early in May, Joe Mortimer, game warden on the Lepreaux reserve, became ill. News of his illness was carried to Saint George by a passing ranger, and Dr. Fred Cheeseman, of Saint George, began the long trip by car and later for twelve miles on foot along a blazed trail to Victoria Lake, where he found the sick man to be suffering from typhoid. It was impossible to bring the man out by the road traversed by the physician, therefore Hon. Dr. H. I. Taylor, Minister of Health, in collaboration with Hon. L. P. D. ..... Minister of Lands and Mines, chartered a seaplane from Montreal and in this way conveyed the sick man to the Chipman Memorial Hospital, at Saint Stephen. In these prosaic days, there is still a thrill in the practice of medicine in certain parts of our great Dominion.

It has been announced that tenders will be called for the erection of a fire-proof wing as an addition to the Lancaster Hospital of the Department of National Health in Saint John. This, with necessary improvements and alterations in the present building, will provide necessary increased accommodation and also a fireproof repository for the records of the department at this centre.

A. STANLEY KIRKLAND

Nova Scotia

The annual meeting and dinner of the Halifax Branch of the Medical Society of Nova Scotia took place on April 26th, at the Nova Scotian Hotel with 42 members in attendance. Following the reading of the Minutes of the last meeting, and reports of committees, the Secretary-treasurer rendered his report for the session. (This was in the nature of a review). It had opened with the Annual Golf Tournament at Ashburn on August 17, 1932. During the session, one special and eleven regular meetings were held with an average attendance of thirty-four. Six new members were added to the roll. Reference was made to the great loss suffered by the Society when Dr. E. V. Hogan passed away in January. The membership now stands at one hundred and twelve.

Election of officers for the session 1933-34 resulted as follows: *President,* Dr. H. B. Atlee; *Vice-President,* Dr. F. V. Woodbury; *Secretary-Treasurer,* Dr. C. W. Holland; *Executive:* Drs. M. G. Burris, E. K. Macllellan, A. E. Murray, H. W. Schwartz. The retiring President, Dr. W. Alan Curry in a short speech thanked the members of the executive and the Secretary-Treasurer for their assistance during his term of office. Dr. Atlee, President-elect took the chair. He thanked the members for the honour of electing him, and pledged his best efforts to live up to the office.

The Nova Scotia Tuberculosis Commission is to be commended for drawing the attention of the public to the ravages of tuberculosis. It has given considerable publicity in the press to the means adopted for eradication of tuberculosis. The Commission points to a reduction of 15 per cent in the death rate in the course of the past six or seven years. This has been largely due to the educational program instituted by the Commission. An appeal for membership in a worthy cause is being made at present.

Dr. Michael Carney of the Medical Faculty of Dalhousie University has been elected to membership of the Senate of St. Mary's College. He succeeds the late Dr. E. V. Hogan.

N. B. DREYER

Ontario

A banquet was tendered by the Board of Governors of the University of Western Ontario to the Honourable W. J. Roche of Ottawa who, fifty years ago, obtained the first medical degree conferred by Western University.

The Senate of the University of Western Ontario has decreed that all students entering medicine in September next must have a senior matriculation certificate.

The Sudbury Medical Society met at St. Joseph's Hospital, Sudbury, on May 18th with Dr. W. C. Morrison presiding. An interesting and instructive address was given by Dr. A. W. Farmer, of Toronto, on "Burns, early and late treatment, including treatment by plastic surgery for scar tissue and contractures." Following this paper, there was an open discussion on the subject of the best treatment for burns peculiar to local hazards as, for instance, burns produced by splattering molten metal. This burns through clothing and deep into the flesh, almost like a puncture hole, differing from the usual flat, surface burn. The meeting was attended by eighteen physicians and six nursing sisters from the hospital.

The York County Medical Society has adopted an excellent plan in regard to programs for their regular meetings. At the beginning of the year, the membership was divided into groups of five with the first name as Chairman of the group. Each group supplied at least two papers from its members for each meeting. The arrangement has met with an excellent response from the local men.

The following medals, prizes, scholarships, and fellowships, were awarded by the Senate of the University of Toronto in the Faculty of Medicine, at the June Convocation,—

Sixth year.—Gold Medal, W. J. Hendry, B.A.; Silver Medal, I. C. Sherman; Silver Medal, G. E. Hobbs, B.A.; The Ellen Mickle Fellowship, W. J. Hendry, B.A.; The Chappell Prize in Clinical Surgery, J. R. F. Mills; The David Dunlap Scholarship, W. W. Simpson, Ph.D.; The Ontario Medical Association Prize in Preventive Medicine, D. Telford, B.A.

Undergraduate. — The David Dunlap Scholarships. Fifth Year, Miss J. C. Gray, B.A.; Third Year, W. A. Scott. The Baptie Scholarship, K. J. R. Wightman; The James H. Richardson Fellowship in Anatomy, H. C. Elliott, B.A.

Graduate.—The George Brown Memorial Scholarship in Medical Science, J. A. Dauphinee, M.D., Ph.D.; The Starr Gold Medal, C. B. Weld, M.A., M.D.; The Alexander McPhedran Research Fellowship in Clinical Medicine, H. E. Rykert, M.D.; The J. J. Mackenzie Fellowship in Pathology and Bacteriology, J. R. E. Morgan, M.D.; The Reeve Prize, G. W. McGregor, M.B.; The George Armstrong Peters Prize, W. S. Keith, B.A., M.D.; The Lister Prize in Surgery, D. R. Mitchell, B.A., M.B.

J. H. ELLIOTT

Saskatchewan

The Moose Jaw Medical Society has been trying ever since last fall to come to some agreement with the City Council in regard to the treatment of the indigent sick. A committee of doctors was appointed to meet the health and relief committee of the Council, but the discussion was followed by no action. Later the Medical Society met as a body with the Council, to be informed later that they would do nothing.

The Medical Society offered to perform certain parts of the work for nothing, and to do the rest of it at a reduced rate. They offered to take in payment credit on their property taxes or business taxes. In fact they offered to consider any equitable proposition from the city. None has been proposed.

Since the City Council has refused to take any responsibility for the indigent sick as far as payment of the doctor is concerned, the Medical Society has given notice to the public that on and after June 1st written authority from the city must be obtained by all indigent sick, except in cases of emergency, before treatment will be undertaken by the members of the medical profession.

Moose Jaw Medical Society were hosts to the Regina and District Medical Society at a dinner at the Moose Jaw Club. Papers were given by Dr. William Wardell, of Moose Jaw, on "Fractures of the Os Calcis," illustrated by x-ray pictures and by Dr. Joe Brown, of Regina, on "Influence of operative obstetrics on maternal and infant mortality," in which he decried lack of patience and tendency to interference on the part of many modern obstetricians. Later in the evening the doctors went swimming in the new Natatorium.

LILLIAN A. CHASE

General

Darling Foundation.—A Foundation has been created by the Health Organization of the League of Nations in honour of the late Dr. Samuel T. Darling, who met his death by an accident while conducting a mission on behalf of the League. The purpose of this Foundation is the periodical award of a prize known as "The Darling Foundation Prize" to the author of an original work on the pathology, etiology and prophylaxis of malaria.

The first award of the Foundation will take place on January 1, 1934.

The Secretary of the Darling Foundation Committee received the following letter, dated April 27, 1933, from the Chairman of the League of Nations' Malaria Commission:

> "I have the honour to inform you that the Malaria Commission, having before it the names, communicated by you, of the candidates suggested for the first award of the Darling Foundation on January 1, 1934, made a first choice of six candidates. From these the Commission finally selected Colonel S. P. James, his qualifications appearing to them to stand out pre-eminently, as recipient of the first Foundation Prize. The five other names noted by the Commission are as follows (in alphabetical order): Sir Richard Christophers, Dr. Falleroni, Dr. L. W. Hackett, Dr. W. Kikuth and Professor M. Missiroli."

The Darling Foundation Committee accordingly decided at its meeting in Paris on April 29, 1933, to award the Prize to Colonel S. P. James, Ministry of Health, London.

The Canadian Association of Massage and Remedial Gymnastics

President—Mrs. H. A. McKean, 458 Mt. Stephen Ave., Westmount, Que.; *Vice President and Educational Secretary*—Mrs. W. H. Woodcock, 17 Unsworth Ave., Toronto; *Sec.-treas.*—Miss M. Finley, 1551 Bishop St., Montreal.

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MEMBERS OF THE CANADIAN ASSOCIATION OF MASSAGE AND REMEDIAL GYMNASTICS

(Incorporated by Dominion Charter, 1920)

January, 1933

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Members in U.S.A.:— Iowa—Miss E. E. Johnstone, 523 6th Ave., Council Bluffs Clinic, Council Bluffs. Omaha, Neb.—Miss M. Potts, 831 Medical Arts Bldg.

Book Reviews

An Introduction to Analytical Psychotherapy. T. A. Ross, M.D., F.R.C.P.E., M.R.C.P., Medical Director of Cassel Hospital for Functional Nervous Disorders. 203 pages. Price 10/6 net. Edward Arnold & Co., London, 1932.

This book is of great interest in so far as it comes as a supplement to the author's previous work on the treatment and diagnosis of the neuroses, and is certainly a definite extension of his previous ideas. The author in his capacity as medical director of the Cassel Hospital for Functional Nervous Disorders is much concerned with the advancement of psychotherapeutic methods, and has been particularly impressed by the great stimulus that has been given to this field by Freud. He does not, however, claim that this is any exposition of Freud's teaching and methods but, on the contrary, states that the book is to be taken as a record of his personal experiences. It is particularly valuable just in this regard. The topics discussed are all illustrated with clinical material which will prove interesting reading to all medical men, and do not pre-suppose any special knowledge of psychology or psycho-pathology. The breadth of the author's viewpoint is well summed up in the concluding sentences of the book: "For the investigation of the physical causation of disease there is a multitude of workers with first-class brains. This book has been written largely with a hope that it may be seen by some of these, and that it may induce them to turn their attention to the study of the problems of the mind." The book can be highly recommended to all medical men and it should be emphasized again that it will prove easy to read and understand by those without special psychological training. The specialist will also welcome the book as a personal statement from one of the leaders in this field in Great Britain.

Mental Deficiency Due to Birth Injuries. Edgar A. Doll, Ph.D., Director of Research, Training School at Vineland, Winthrop M. Phelps, M.D., Professor of Orthopædic Surgery, Yale University and Ruth Taylor Melcher, M.A., Research Assistant, Training School at Vineland. 289 pages illustrated. Price $5.50. Macmillan Co., New York and Toronto, 1932.

This book is the account of a valuable piece of work that was initiated by feelings of personal sympathy relating to the birth injury of a child known personally to some of the workers concerned. The study was done in the Training School at Vineland. One of the authors (E. A. D.) comments in the preface on the fact that an obvious need has existed for a long time to evaluate more carefully the actual handicap in such cases. He and his colleagues felt in regard to the particular child mentioned that there was no real mental retardation, and that none need ensue, except in so far as the child might be prevented from a natural expression of mental development through reason of the motor handicap. From this beginning the study was extended to a series of cases suffering from the effects of birth injury.

One of the chief tasks confronting the authors was to find means of estimating the mental status of the patients and of measuring mental progress. This latter problem arose also in the endeavour to assess the results of physio-therapeutic measures applied. The results achieved in the application of a battery of mental tests are given in detail, with a critical statement as to their application and interpretation, and of the validity of the findings made. This particular part of the study is an example of a type of study that should receive more attention than it has done in the medical field, if we are to make progress in the understanding and correct treatment of cases associated with cerebral damage. A chapter on etiology is included, which contains a review of the literature. The section on physical therapy is worthy of particular mention as a serious effort to evaluate in critical fashion the results of such treatment. Complete accounts are given of the birth and developmental histories, accompanied by photographs of the subjects. Also worthy of mention are the summaries given at the end of each chapter; these should prove of assistance to many readers.

This book should be in the hands of the many members of the medical profession who have to deal with such cases—the pædiatrician, orthopædist, neurologist and psychiatrist. Last, but not least, it is to be hoped that it will not be overlooked by the obstetrician and neuro-surgeon. It is to be hoped, also, that the prevalence of such cases will be greatly reduced by the cooperative efforts of these two branches of medicine.

Hookworm Infection. Clayton Lane, M.D., Lieut.-Colonel, Indian Medical Service (Ret'd.). 319 pages, illustrated. Price $7.50. Oxford University Press, London; McAinsh & Co., Toronto, 1932.

The task of reviewing a book dealing with an exotic subject is not an easy one. The incidence of hookworm infection in Canada is not a topic of paramount importance to the Canadian practitioner. Nevertheless it is a matter of no inconsiderable academic interest. We have now plenty of what used to be uncommon infections in this country. Trade and commerce are responsible for more than *industrial* reciprocity. The tropical, subtropical and temperate zones, in the course of international relations, are prone to be linked up as harbingers of exotic as well as indigenous entities of "grief" both in matters of business and public health. It is therefore desirable that at least a nodding acquaintance with unusual clinical phenomena should be cultivated. The book under review brings the subject of ankylostomiasis into the higher consciousness of members of our profession, whose day's work is directed chiefly to indigenous clinical problems. For this reason, we may be prepared the better to recognize the exotic in isolated instances when ordinary processes of analysis are ineffective.

From a practical point of view in this northern latitude, the study of certain bizarre forms of anæmia should not be regardless of such important etiological factors as *Necator americanus, Ancylostoma duodenale,* and *Ancylostoma braziliense.* The monograph of Lieut.-Colonel Clayton Lane is calculated to supply a highly valuable source of reference to any Northerner whose clinical alertness or scientific curiosity directs his attention to a subject which in other parts of the world is of the very greatest importance.

The essentials of research in parasitology may be summed up as: (1) the biological characters of a given organism; (2) the inter-relationship of the organism to man and to animal or plant life; (3) the modes of infection; (4) the pathological effects upon the host or hosts including the question of immunity; (5) the clinical manifestations of that pathology; (6) the methods of precision in establishing the diagnosis; (7) the treatment, curative and preventive. The text under review may be stated unequivocably to cover these points. The bibliographical references in half a dozen languages and covering a score of pages would indicate the very wide reading that the author has accomplished in synthesizing his material. At the same time the text itself smacks of a very profound first-hand and authoritative knowledge of the subject. There is no undue suggestion of scissors and paste-pot. Colonel Lane's magnum opus is a monument to his unremitting study which Indian Army service has made possible. His book is ample evidence of his devotion to his task and of his faculty of filling the unforgiving minute with sixty seconds worth of distance run.

Diabetes in Childhood and Adolescence. Priscilla White, M.D., Physician at the New England Deaconess Hospital, Boston. 236 pages, illustrated. Price $3.75. Lea & Febiger, Philadelphia, 1932.

The facts recorded in this book are based on the study of 750 juvenile patients. The etiology of diabetes may be heredity. It may be inherited as a recessive character. Interesting data pointing in this direction are given. In October, 1931, 39 per cent, or 208 children among 533 living patients studied, showed hereditary diabetes, in 72 diabetic children who have lived 10 years or more the hereditary element has reached 53 per cent. The relative incidence of infections in the past history of diabetic children prior to the onset of the disease has not even equalled that of the general juvenile population, thus the somewhat prevalent belief that infections cause diabetes in childhood is shown to be false. Treatment is fully and definitely discussed. The optimism which has always radiated from Joslin's clinic shines through the book. "With insulin treatment the death rate from diabetes in childhood has fallen to the vanishing point, growth in height and weight are assured and it is becoming apparent that complications are exceptional in the patient whose disease is controlled."

Any general practitioner who treats diabetic children should own and study this book. Those especially interested in diabetes will find the book an authoritative reference.

Sound Conduction and Hearing. A. Zünd-Burguet, Doc. Univ. Paris. Translated by Macleod Yearsley, F.R.C.S., Consulting Aural Surgeon to St. James' Hospital. 139 pages. Price $2.40. John Bale, Sons & Danielsson, London; Macmillan Co., Toronto, 1932.

This book is of great interest in that it deals with the subject in a constructive manner and very thoroughly. Beginning with a historical review of the evolution of the conceptions of the mechanism of hearing from the time of Hippocrates to the middle of the 19th century, the author traces the gradual change from the hypothesis of sound conduction by the air of the middle ear and the sound window to those of transmission by the ossicles and oval window. As regards perception the early idea was that it was the function of the labyrinth as a whole. Later this function was allotted to the cochlea, and finally came the theory which named the cochlea as an analyzing agent. From these sources the Helmholtz theories of sound conduction and perception were built up, and some eight pages are devoted to a brief summary and preliminary discussion of these in themselves.

As regards present views on the perception of sound the brief chapter on this subject is brought to a conclusion with the following remarks: "How does a sound impress the nerve endings? The question is extremely complex, and is not solved in the present state of knowledge. At all events, the hypothesis of Helmholtz appears untenable."

The penultimate chapter is devoted to a "critical examination of the chief experiments and interpretations which have been deduced therefrom." Finally, we come to the chapter dealing with the theory of sound conduction supported by the author. Drawing proof from comparative anatomy, physiology, histology, pathology

and physics he raises many topical objections to all our generally accepted ideas, and clearly and convincingly states his views on this much debated subject. Altogether it is a most instructive work and gives much food for thought.

Internal Derangement of the Knee-joint. A. G. Timbrell, M.D., M.B., Ch.B., F.R.C.S., 2nd ed. 205 pages, illustrated. Price 15/- net. H. K. Lewis, London, 1933.

The second edition of this monograph shows that the author's interest in his subject has been maintained. Much work has been done on the anatomy and pathology of the knee-joint by the author and his conclusions have been clarified thereby. He has also had the benefit of a more extended experience and an opportunity to evaluate his methods from the histories of his cases. The analysis of results is an honest statement with no attempt to excuse a failure or to glorify a success.

The position of manipulative methods in treating various conditions in the knee-joint is made rational and the indications for such treatment are definitely described together with the approved technique. Operative procedures are well described, with emphasis upon the advantages of displacing the patella by the author's method in securing the best exposure of the articulation in removal of loose bodies or in attacking the graver derangements such as rupture of crucial ligaments or avulsion of the spine of the tibia.

The value and limitations of surgical treatment of osteo-arthritis and rheumatoid arthritis are sanely discussed. The book is enriched by a foreword from Sir Arthur Keith and by notes on cases by the late Sir Robert Jones. These notes were published after the death of this greatest of contemporary orthopædic surgeons and are probably among the very last of his writings. The researches in anatomy and pathology will be welcomed by the specialist in orthopædics while the whole book will appeal to general surgeons or to practitioners who meet the conditions described only occasionally.

The Science and Practice of Surgery. W. H. C. Romanis, M.A., M.B., M.Ch., F.R.C.S., F.R.S. and Philip H. Mitchiner, M.D., M.S., F.R.C.S. 4th ed., 2 vols. 971 pages and index, illustrated. Price $12.00. Lea & Febiger, Philadelphia, 1933.

A genuine attempt has been made in this edition to bring the subject matter up to date. This is particularly apparent in the rewriting of the section on diseases of the ear, nose and throat by Mr. Neilson, the section on radiology and radium treatment by Dr. Fildes and on anæsthetics by Dr. A. F. Potter. The chapter on fractures and dislocations has been modernized. The authors apparently do not share the objections to the use of plaster of Paris expressed by certain English writers in recent monographs.

Many other sections of the work deserve commendation of a special kind. These include cerebral surgery and diseases of bone in relation to disorders of the parathyroid glands. The discussion of diseases of the spleen has been remodelled and the treatment of varicose veins by injection methods is lucidly described.

The work is well printed and fully indexed. As a text-book it is highly commended.

The Physical Mechanism of the Human Mind. A. C. Douglas, M.B., Ch.B., Hon. Surgeon, Dunfermline and West Fife Hospital. 251 pages. Price $4.50. E. & S. Livingstone, Edinburgh; McAinsh & Co., Toronto, 1932.

The author, a surgeon, has set for himself a real task. When, after perusal, the book is laid down, the impression remains that he has succeeded about as well as others who have essayed the same task, and that is, not very well. There is no doubt whatever as to the ultimate desirability of his aim, nor of his sincerity, but the final result of his rather difficult-to-follow excursion into psychology, logic and physiology is more satisfying to him than it will be to others. He has clearly foreseen the difficulties, however, and quite frankly states that his intention is to bring forward a hypothesis which will provide a strictly materialistic explanation of mental activity.

No one could complain of nor object to the considerable portion of the book devoted to the restatement of pretty well accepted facts and reasonable theories in physiological psychology. It is when, on the basis of these, the author seeks to establish his own hypothesis that distinct difficulties and differences arise. Many of the diagrams supplied illustrate very well the various aspects of this hypothesis, but they will be received critically by the unconvinced.

It is rather hazardous practice to originate words. The author coins one—"senglion." His definition of "senglion" is, "a cortical neurone or group of neurones, stimulation of which evokes a definite memory sensation," "the psycho-neural units of Mind." Obviously the term refers to a unit of structure with a certain function. Subsequently reference is made to the "registering" of senglia as if they were of another nature—something resembling sensation perhaps. For the philosophically minded the book will provide much that is stimulating and of interest. The busy practitioner or student will fail to be impressed, one fears.

Diseases of Old Age. F. Martin Lipscomb, M.R.C.P., Major Royal Army Corps. 472 pages. Price $3.75. Baillière, Tindall & Cox, London; Macmillan Co., Toronto, 1932.

In this monograph Major Lipscomb has embodied the results of a unique opportunity for the observation of disease as it manifests itself in the old age of a group of men who in their prime were of more than average physical fitness and development, and therefore offered a maximum resistance to the maladies which affect the aged. The subject has been approached from a purely clinical standpoint and the conclusions arrived at are founded on extended and accurate observation. The diseases of the aged are considered under the different organs and systems affected and many statistical statements of incidence, morbidity, and mortality are included. Much information of the greatest practical value is given as to the degenerative changes in organs which time produces, and the caution necessary in the use of remedies and in the prognosis is emphasized. This work should find a place on the shelves of the general practitioner and the institutional worker, and will furnish the solution to many a troublesome problem arising in the care of this class of patient.

BOOKS RECEIVED

Nursery Guide, a vade-mecum on Infant and Child Care. Louis W. Sauer, Ph.D., M.D., Associate in Pædiatrics, Northwestern University Medical School. Third edition, 208 pages, illustrated. Price $2.35. C. V. Mosby, St. Louis; McAinsh & Co., Toronto, 1933.

Diagnosis and Treatment of Postural Defects. Winthrop Morgan Phelps, B.S., M.D., M.A., F.A.C.S., Professor of Orthopædic Surgery, Yale University, and Robert J. H. Kiphuth, Assistant Professor of Physical Education, Yale University. 180 pages, illustrated. Price $4.00. C. C. Thomas, Springfield and Baltimore, 1932.

Care of the Nose, Throat and Ear. W. Stuart-Low, F.R.C.S., Consulting Surgeon to Central London Nose and Ear Hospital, etc. 102 pages. Price $1.50. Baillière, Tindall & Cox, London; Mac-

Sex Determination. F. A. E. Crew, M.D., D.Sc., Ph.D., Professor of Animal Genetics in University of Edinburgh. 138 pages. Price 3/6d. Methuen & Co., London, 1933.